MODERN MECHANIX & INVENTIONS MAGAZINE

February

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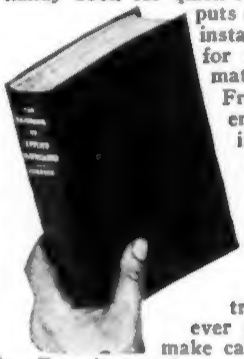

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(M. M. 2-36)

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HOW JACK LEARNED THE SECRET OF BEING POPULAR *You can learn it too..* FREE

JACK was lonesome. He was always left out of the parties and good times. Then he learned the secret of being popular—he became an expert harmonica player—and now Jack is the first one to be invited.

Thousands of boys and girls all over the country have found the harmonica a short cut to popularity. At school or play, at parties, or meetings, the harmonica player is the center of a group of swaying, singing boys and girls. Thousands of schools have harmonica bands, and are they popular!

Harmonica Is Easy To Learn

The harmonica is the simplest possible instrument to play, and now, without costing you a cent you can become a fine player in a short time. Mail the coupon below and our Illustrated Instruction Book "The Art of Playing the Harmonica" will be sent to you *absolutely free*. This book *tells* and *shows* you in pictures just what to do and how to do it. Just follow the simple instructions and in a short time you'll be amazing your friends with the way you can perform.

Professional Players Use Hohner Harmonicas

Nearly all of the expert harmonica players you hear over the radio or on the stage use Hohner Harmonicas, because they are true in pitch, rich in tone, and perfect in construction. If you have heard Carl Freed and his famous Harmonica Harlequins, or other artist players over the radio or on the stage, you know what wonderful musical effects can be secured with Hohner Harmonicas. So if you want the *best*, be sure to ask your dealer for a Hohner. Accept no substitute. Look for the Hohner name on the instrument and on the box.

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We want every boy and girl to know how quickly and easily they can learn to play a Hohner Harmonica. Fill in the coupon and we will send you absolutely free without any obligations our complete Instruction Book "The Art of Playing the Harmonica". Remember it's absolutely free, so mail the coupon today.

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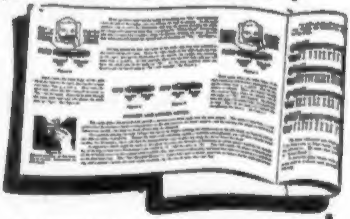

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MODERN MECHANIX & INVENTIONS MAGAZINE

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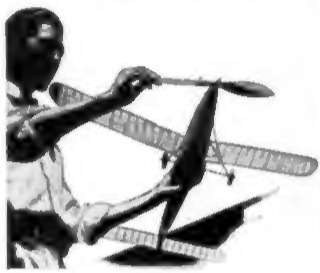

For 12 minutes and 40 seconds this model plane soared aloft to set a new world's record. Then it flew out of sight of the judges, and its additional flying time did not count.

From its designer, Russell Youngbluth, who is shown with his plane, M.M. secured the plans for building this world's record plane. They are being published in the March issue. Reserve your copy NOW.

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TODAY . . .

Almost Broke!

Yet tomorrow Tom Smith will be on his way toward being a really successful man . . .

SOMEWHERE there is a Tom Smith—that name is as good as any—who is practically flat broke, back on his heels and discouraged today. Perhaps he's in debt. Perhaps, as far as his job is concerned, he's in a rut. Perhaps he's just a victim of these trying times. Yet—he still has vision, imagination. And—ambition. He still believes that he's going *somewhere* . . . somehow, some way, some time. He hasn't given up hope. He still believes in [illegible] and opportunity.

Tom Smith will read this advertisement. No—there is a better way of saying it. Tom Smith *will study* this advertisement. He will read it once, then again, then yet again. It will strike a responsive chord somewhere within him. It will stir his dormant ambition, give wings to his imagination, set his vision afire. And he will *act!* As though Hope—as swift and powerful as lightning when it strikes—had suddenly taken possession of him, he will take advantage of the opportunity this advertisement offers him. And then—

Six months from now, his friends will say, "Have you heard about Tom Smith? Yes—just got a new job with an increase in salary." And two years later, the business journals in his field may report, "Thomas Smith Appointed Manager." And five years . . . or ten . . . or fifteen years hence, the sign on his office door may read "Thomas Smith, President."

All because Tom Smith had the vision, the imagination, the ambition, to recognize the significance of this advertisement. Because he had the foresight to see that here was his way to opportunity.

* * *

This page advertises the training of LaSalle Extension University. It is a unique university in many respects. It utilizes Uncle Sam's postal service in its contacts with its students. It is the university for those men and women who work by day in every type of business and profession. It is the university of the clerk ambitious for success in accountancy. It is the university of the business man with an eye upon an executive position. It is the university of men and women, young and middle aged, who wish to become accountants, bankers, sales managers, traffic experts or specialists in some one of twenty different fields. In short, it is the university for ambitious people, determined to succeed, who recognize that only by thorough specialized training can they reach their objectives.

In the history of LaSalle Extension University, there have been more than 850,000 such men and women. They have gladly substituted night hours of study for night hours of aimless pleasure. They have sacrificed hours of minor enjoyment to reach years of major success. They have studied hard—accumulated the accurate, comprehensive and practical training LaSalle offers by its famous Problem Method—thus wresting from Life the success which long before many had thought was not for them.

The LaSalle Method is comprehensive, yes. It is accurate, up-to-the-minute and alive. It is invaluable training. But above all things, it is a Road Toward Success. It is not an easy road. It is not the road for sluggards, for those who refuse to sacrifice and work. Rather, it leads to their destination only those who have the will to *finish* what they have once *begun*.

* * *

Perhaps you think that prophecy of Tom Smith's career mentioned above is pure fantasy. Perhaps you feel it is solely the product of an advertising writer's imagination. If such are your beliefs, you are wrong. For that prophecy is based upon past experience—

The past experience of thousands of discouraged Tom Smiths who read just such an advertisement as this years ago. Tom Smiths with vision and ambition and imagination who accepted LaSalle's offer of one of the booklets listed below. And—who found the booklet so intriguing, so full of hope, that they enrolled in LaSalle . . . and as the months passed, they found themselves rising out of their rut, reaching toward more attractive and better-paying jobs. Finally, achieving rich and deserved success in their chosen lines.

Tom Smith, wherever you are, whoever you are, whatever are your ambitions—here is your opportunity! Are *you* going to pass it by?

LA SALLE EXTENSION UNIVERSITY, Dept. 2493-R, Chicago

I am in earnest about my success and I would like to have your special booklet—without any cost or obligation to me—about my opportunities and your success training in the business field I have checked.

☐ Business Management	☐ Industrial Management
☐ Higher Accountancy	☐ Modern Foremanship
☐ Traffic Management	☐ Personnel Management
☐ Modern Salesmanship	☐ Business Correspondence
☐ Commercial Law	☐ Business English
☐ Law: Degree of LL. B.	☐ Effective Speaking
☐ Expert Bookkeeping	☐ Office Management
☐ C. P. A. Coaching	☐ Stenotypy

Name..... Age.....

Position..... Address.....

La Salle Extension University

Ask for one of these booklets—or a similar one on your own field of business. They are free!

LEARN AT HOME TO

I'LL TRAIN YOU QUICKLY

FOR GOOD SPARE TIME AND FULL TIME

RADIO JOBS

If you are dissatisfied with your present job —if you are struggling along in a rut with little or no prospect of anything better than a skinny pay envelope—CLIP AND MAIL THE COUPON NOW! Get my big 64-page FREE BOOK on the opportunities in Radio. Read how quickly you can learn at home in your spare time to be a Radio Expert—what good jobs my graduates have been getting—real jobs with real futures.

Real Opportunities Ahead in Radio for Trained Men

It's hard to find a field with more opportunities awaiting the trained man. Why in 1934 the Radio industry sold $235,000,000 worth of sets and parts! Over 300,000 people worked in the industry! It's a gigantic business, even in the poor business years. And look what's ahead! Millions of sets are going out of date annually. 20,000,000 sets are now in operation on which over $100,000,000 are spent EACH YEAR for repairs, servicing, new tubes, etc. Broadcasting stations pay their employees (exclusive of artists) approximately $23,000,000 a year. Advertisers pay 600 great Broadcasting Stations over $75,000,000 a year for Radio time and talent. A few hundred jobs that paid $30, $50, $75 a week less than 20 years ago have grown to thousands. These figures are so big that they're hard to grasp. Yet they're all TRUE! Here's a new industry that has grown to be a commercial giant! No wonder business leaders predict a brilliant future for the great and growing Radio industry.

Get Into This Field With a Future

There's opportunity for you in Radio. Its future is certain. Short wave, police Radio, automobile Radio, loud speaker systems, aviation Radio, marine Radio—in every branch developments and improvements are taking place. Here is a real future for additional thousands of trained men who really know Radio. And Television—another Radio development—promises many good jobs soon. One million dollars is now being spent on two stations, and receiving sets are being designed and built. New opportunities are right ahead. Get the Training that opens the road to good pay and success! Send me the Coupon NOW—and get full particulars on how easy and interesting I make learning at home. Read the letters from graduates who are earning real money in this fascinating industry.

Learn at Home in Your Spare Time to Be a Radio Expert

Hold your job. There is no need for you to leave home. I will train you quickly and inexpensively in your spare time. You don't have to be a high school or college graduate. My Course is written in a clear, interesting style that most anyone can grasp. I give you practical experience under my 50-50 method of Training—one-half from Lesson Books and one-half from practical experience with equipment I give you. This unique and practical method has been called one of the greatest developments in home study Radio training.

Here's Proof

Best Equipped Shop in Town

"In the last year we have enlarged our Radio shop and we now have the best equipped Radio Repair Shop in East Toledo. We also have a shop at 624 Milton Street. We have three fellows working for us."—W. R. Brown, 309 Main St., Toledo, Ohio.

$15 a Week in Spare Time

"My spare time earnings average $15 a week. Since studying with you I have earned about $7,000 to $8,000 in Radio. I owe my success to the good method of the N. R. I."—C. N. Hoffelmeyer, R. F. D. No. 1, Temple, Pa.

Now Has Fine Business

"I have a fine business servicing sets. I am making a good living—seldom have a week under $40. If it wasn't for N. R. I., I would probably be tramping the streets."—Glenn C. King, 46 Division Ave., S., Grand Rapids, Mich.

Get the Facts about THE TESTED WAY

MAKE MORE MONEY

Many Make $5, $10, $15 a Week Extra in Spare Time While Learning

My big 64-page book gives proof that many make $5, $10, $15 a week extra servicing sets in their spare time soon after enrolling. I give you plans and ideas that have made good spare time money—$200 to $1000 a year—for hundreds of fellows. My Course is famous as "the one that pays for itself."

Money Back If Not Satisfied

I am so sure that N. R. I. can train you at home satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lesson and Instruction Service upon completing your Course. You'll get a copy of this agreement with my Book.

64-Page Book Free

Get your copy TODAY. It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time job opportunities; it tells you about my Course; what others who have taken it are doing and making. Find out what Radio OFFERS YOU—without the slightest obligation. MAIL THE COUPON in an envelope, or paste it on a penny postcard NOW.

J. E. SMITH, President
National Radio Institute
Dept. 6BH, Washington, D. C.

You Get PRACTICAL EXPERIENCE with Radio Equipment I Give You

I'll show you how to use my special Radio Equipment for conducting experiments and building circuits used in such well-known sets as Westinghouse, General Electric, Philco, R. C. A.-Victor, Atwater Kent and others. You work out with your own hands many of the things you read in our lesson books. This 50-50 method of training makes learning at home easy, interesting, fascinating, intensely practical. You learn how sets work, why they work, and how to make them work.

MAIL TODAY FOR FREE 64 PAGE BOOK

J. E. SMITH, President
National Radio Institute, Dept. 6BH,
Washington, D. C.

Dear Mr. Smith: Without obligating me, send free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please write plainly.)

NAME.....AGE.....

ADDRESS.....

CITY.....STATE.....

TO BETTER PAY NOW

A 2-Minute Job

PLASTIC WOOD
Fills Cracks in Baseboards, Floors

Now . . . it's no work at all to make many repairs yourself—broken furniture, fill cracks, nicks and holes in wood, fasten loose drawer pulls, casters and bathroom fixtures, cracks around bathtubs, etc. —with this scientific product called Plastic Wood. Users say it handles and shapes as easily as putty—and quickly dries to hard, permanent wood that "stays put" on wood, metal, plaster, porcelain.

You can drive nails and screws into genuine Plastic Wood without it splitting or crumbling—you can paint it, carve it, finish it just like real wood—for inside or outside work, as it is waterproof and weatherproof.

To be sure you have the genuine—look for the name Plastic Wood on the container. Paint and hardware stores sell it in 25c tubes and 35c cans. Try it. It will save you a lot of time and money.

Get FREE BOOK! LACO'S sensational 1936 Automatic Oil Burner brings you New Fuel Economy—New Quietness—New Low Prices! $80 to $100 less than others! Cuts fuel costs 25%! More heat from cheap #1 oil. Only 1 moving part—nothing to cause trouble. Approved by Underwriters Lab. Built by one of world's largest manufacturers. Over 50,000 in use. Be modern—end furnace drudgery forever.

WRITE See your LACO dealer. If none near you, send today for special Low Direct Offer!

LACO OIL BURNER CO., 226 Union St., Oriental, Ia.

Special offer to DEALERS

LACO sales doubled this year. 1 good more desirous to make Installations. Get our attractive co-operative sales-saver plan. Write quick. L.A. COOK LBR. Pres.

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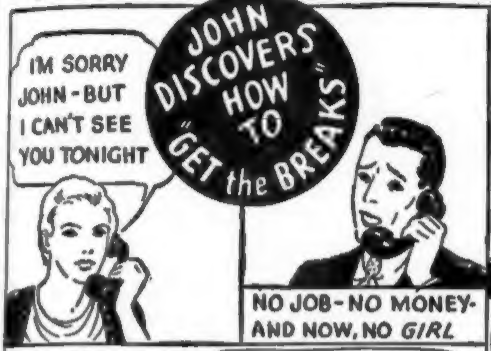
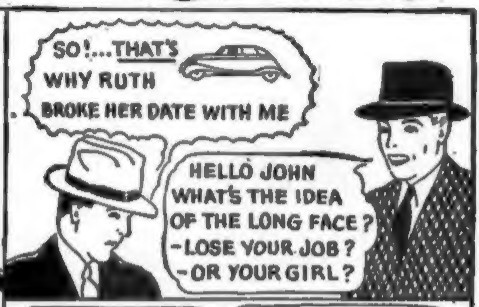
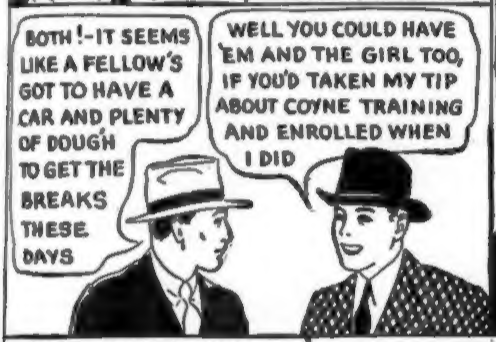
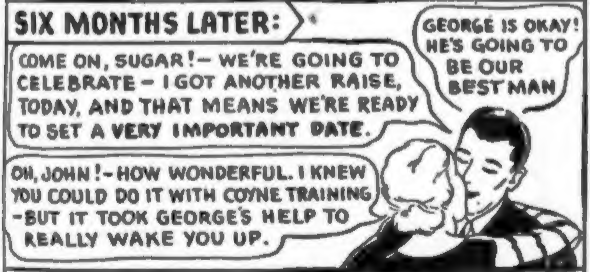








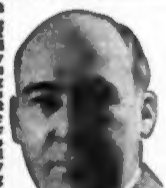
COYNE H. C. LEWIS, PRESIDENT — FOUNDED 1899
ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 28-53, Chicago

Learn ELECTRICITY IN 12 WEEKS AT COYNE

The great Coyne Shops in Chicago have a world-wide reputation for training ambitious fellows for this big-pay field in only 12 weeks. Then help you by giving you lifetime employment service. By my new plan YOU can take advantage of their wonderful method of learning-by-doing NOW.

I'LL FINANCE YOUR TRAINING!

Get training in 90 days on real electrical machinery. Send the coupon today. If you are short of money I'll send you all details of my finance plan. If accepted, you won't have to start paying tuition until five months from the date you start school, and then you'll have 18 months to complete your payments. Send for Big Free Illustrated Book telling all about COYNE and how many earn while learning and the training you can get there without book study or useless theory.



H. C. Lewis

COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 28-53, Chicago, Ill.

H. C. LEWIS, President,
Dept. 28-53 500 S. Paulina St., Chicago, Ill.

Send BIG FREE Illustrated Book on ELECTRICITY and details of your Pay-Tuition-After-Graduation Plan.

NAME _____ AGE _____

ADDRESS _____

CITY _____ STATE _____

Make Sure the Portable You Buy has TOUCH CONTROL!

Only Royal gives you this feature—the most important improvement ever presented on a typewriter! With Touch Control you can instantly adapt the key tension to your exact finger pressure!

Other Amazing Exclusive Features

Finger Comfort Keys. Centralized Controls. Complete Dust Protection! All mean easier, faster typing—plus lifetime durability!

FREE HOME DEMONSTRATION

FREE! Handsome, durable, weather-proof case. Instantly convertible!

See your nearest dealer—Or

-----USE THIS COUPON!-----

Please send me details of Royal's new purchase plan; also beautiful folder on the New Royal Portable.

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Dept. HH-236, 2 Park Avenue, New York City

Name_____

Street_____

City_____ State_____

Check here ☐ for free Home Course in Touch Typewriting

High School Course in 2 to 4 Years

You can now complete your High School education—*in 2 to 4 years*—by home study. Course prepares for college entrance and teacher's certificate examinations—and advancement in business and industry. Standard H. S. texts used. Diploma awarded. Credit for H. S. subjects already completed.

College Training Liberal Arts Course offers cultural advantages of college training at low cost, by home study. Uses standard texts, supplemented by special study outlines and helps. A real opportunity for H. S. graduates and for older people to overcome your handicap and enjoy the benefits of college training. Write TODAY for Free Bulletin, stating which course interests you. No obligation.

American School, Dept. H-228
Drexel at 58th, Chicago

Home Study Prepares You for the Better Job

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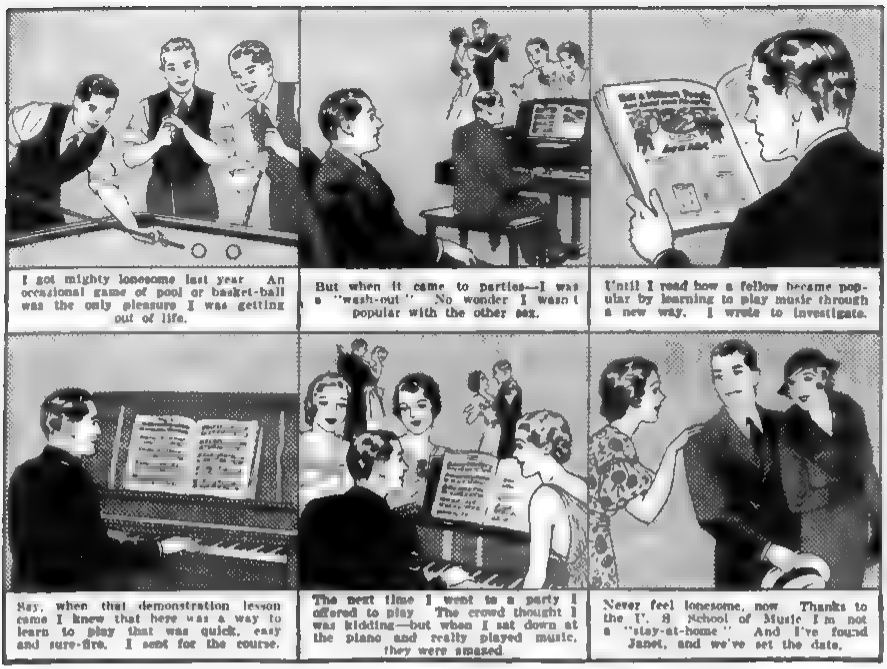

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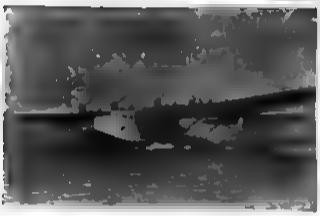

INTERESTING INVENTIONS

The world moves on. Above is the giant Martin China Clipper ship, designed and built by the Glenn L. Martin Company, to carry mail and passengers across the Pacific Ocean. In this luxurious super air liner, are embodied many inventions. It is the last word in modern transportation. But in a few years, even this magnificent bird will be ob-

The Martin Clipper Ship above is a great inventive development. Here you see an ingenious small invention. This little bottle De Capper was recently exhibited at the Bottlers Convention in Baltimore. Makes unnecessary the use of a can opener or bottle opener to remove the cap from a ginger ale or beer bottle. Simple, but think of its great commercial possibilities.

With the Christmas season fresh in mind, many will recall the usual struggle with the Christmas Tree. This recent invention by a woman, Mary Perkulich of California, will do away with all that. Another simple gadget that should appeal to

WE HEAR a lot about the great inventors—Bell, McCormick, Pullman, Kettering, Atwater Kent, and others. But as a matter of fact, most of the articles that we see and use every day of our lives, came to us from people that we never heard of at all. Walk through any dime store and notice the number of simple gadgets that are marked "Patented" or "Patent Pending." Very few people know who thought of them, but there they are. Someone had a bright idea—*and did something about it.* For every big startling inventive development like radio, the automobile or the aeroplane, there are thousands of simple little articles that find their way to the markets, and pay their inventors a profit.

Whether the invention be large or small—simple or complex—one thing is certain, in order to profit the INVENTOR MUST DO SOMETHING ABOUT IT. The world does not reward the man who keeps his ideas locked up in his brain. And in fast moving times like these, the world doesn't wait on the laggard. There are countless others on the alert to go ahead and do the job. The saying that: "He who hesitates is lost" is all too frequently true where inventive matters are concerned.

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I learned, through MM, that postage stamps for collectors can be purchased at their face value from the Philatelic Agency, Washington, D. C. Would you please tell me in what quantities they must be purchased to get them at this price?—M. E. M., Eurebra, Kansas.

There is no minimum on the number of stamps you order through this branch of the Postoffice Department. When ordering be sure to remit by money order or cash. Enclose, too, a self-stamped, addressed envelope.

FUEL OIL FOR AUTOMOBILE ENGINES

I recently drove a Model A Ford equipped with a special carburetor permitting its burning of fuel oil instead of gasoline. I would like to know if this type of fuel is hard on the motor since I am interested in buying this attachment for use on my car. —E. F., Fish Creek, Wis.

Since your car was not built for burning distillates it cannot be expected to perform at its best with this fuel. Oil conversions for gas motors have not been in use long enough to determine just whether or not they have any effect upon the motor.

FORMULAS FOR REMOVING RUST—VARNISH

Could you furnish me with formulas for removing rust, and also paint and varnish? Ones that are not expensive are preferred.—H. G. M., Miami, Fla.

Rust may be removed from iron or steel by applying the following solution with a brush: 100 parts stannic chloride dissolved in 1,000 parts of water; this solution added to one containing 2 parts tartaric acid in 1,000 parts of water, and finally 20 cubic centimeters indigo solution, diluted with 2.000 parts of water are added to the above. Allow acid to act on rust for a few seconds, rub clean with, first, a damp cloth and then a dry. For removing paint use ordinary household lye. This is dissolved in water according to directions printed on the can.

OPERATING NEON SIGNS ON 110 VOLTS

I would like to know if a neon light can be operated on the 110-volt house line. Does it use more or less current than the usual electric lamp? —T. A. W., Mansfield, Ohio.

Neon signs of any length greater than two or three inches cannot be operated on house current. A high voltage transformer is required. Some tubes require voltages up to 7,000, this is due to the fact that the neon gas is of much greater resistance than ordinary incandescent lamps.

USING A NEON SIGN IN AN AUTO

Information as to how I can operate a neon sign in my car would be appreciated. The glass tubing totals about 10 inches.—Dr. L. M., Detroit, Mich.

The use of a step-up transformer will be required to light this sign. It will be necessary that the voltage be A. C. and as the car battery voltage is D. C. the use of an auto radio B power unit is necessary. The vibrator is altered so that it operates a power transformer having an output of at least 2,000 volts. Then sign is connected, then, to the transformer.

MAKING LEATHER HARD AND STIFF

Will you please advise how I can go about preserving a pair of infant's shoes so as to make the leather stiff and hard? I want to paint them with silver or gold bronze.—W. P. D., Jackson, Tenn.

Probably the easiest way of doing this is to use shellac, clear if possible. Give the shoes several coats on both inside and outside. You will find that the shoes will then take the bronze paint very nicely.

RECOVERING A CANOE WITH CANVAS

I wish to recover my canoe with canvas. What

[*Continued on page* 18]

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"Before finishing my training I was made Manager of a Department Store's radio [redacted]"
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"My job paid me $18 a week before taking your training. Shortly after starting was rearranged $60 a week. Have made as high as $250 in single week."
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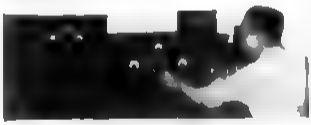

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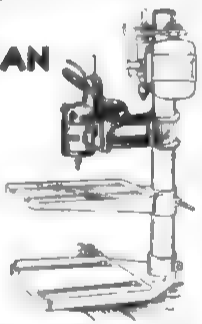

The popular Stanley Electric Router-Shaper is now available with Overarm Attachment to fit on your drill press. Swing the drilling head out of the way, clamp the router arm to the drill press column. Router can be used on either A.C. or D.C. current. Speed is 18,000 R.P.M.—the same speed demanded by the large woodworking plants for beading, routing, veining, carving, inlaying, rounding of edges and other decorative cuts.

By adding a few low priced attachments the Stanley Power Unit can be converted into a portable hand router or a bench shaper. With this equipment in your home workshop you can

BE A PROFESSIONAL

[illegible] descriptive booklet No. 61. It shows the many advantages of this equipment.

STANLEY ELECTRIC TOOL DIVISION
The Stanley Works
100 ELM ST., NEW BRITAIN, CONN.

Made by the makers of the World Famous
STANLEY TOOLS

Problems Editor Answers Queries

[*Continued from page 16*]

is the best method to use? I do not wish the canvas to buckle at the seams. Can you inform me as to where I can get plans for sailing equipment?—W. W. H., Brooklyn, N. Y.

By using two coats of a good waterproofing solution on the canvas and then painting it with two coats of waterproof enamel before varnishing you will encounter little trouble. We suggest that you refer to the new *How to Build 20 Boats* for detailed instructions on canoe covering. Details on canoe sails are also covered in this book.

SOLVING TRI-SECTION OF AN ANGLE

In your December, 1935, issue you state that a 21-year-old youth succeeded in tri-secting an angle. It is very easy, though, to prove that the method described in the article does not trisect the angle by elementary plane geometry. What have you to say about it?—J. P. H., Cornwall, N. Y.

May I point out the slight deviation from absolute accuracy that young Macknik's method will give. It is obvious that since angle VOB is ¼ of the angle to be tri-sected the angle XOV must be ⅓ of angle COB. This must be so since angle XOB must be ¼ plus ⅓ of the quarter COV.—J. E. G., Rochester, N. Y.

I have solved the problem of tri-secting an angle by means of rules and a compass, a real geometric construction. I can prove it, too.—R. C., S. Hempstead, L. I., N. Y.

Referring to the article, "Youth Solves Tri-Section of Angle." In the size of the angle used by your genius mathematician it works out fairly close in degrees, but he has by no means trisected the angle.—F. C., Coraopolis, Pa.

I would not dispute anything accepted by scientists unless I was sure of what I was doing. I have been trying to tri-sect an angle for 4 years. Sometime ago while toying with a compass I accidently did the same thing Macknik did. I became very enthusiastic and proceeded to write out the proof. Of course I ran up against it.—L. M. H., Ansley, Neb.

Although the solution we published is, without a doubt, nearly correct we have never seen a proof that held for all angles. Some mathematicians say that it cannot be done while others insist that it can. MM remains neutral, but appreciates the interest shown by readers. We thank the many persons who submitted not only interesting letters on the subject, but illustrated their theories with very clear mathematical diagrams.

(Editor's Note: Your questions on any problem will be answered personally and free of charge by MM experts if a stamped addressed envelope or reply card is enclosed. Names and addresses of manufacturers of new products described in this issue can also be obtained free on request. Address Problems Editor, Modern Mechanix Publishing Co., Fawcett Building, Greenwich, Conn.)

DIESEL POWER

A Coming American Industry

The internal-combustion engine represents man's supreme triumph of machine power. Diesel engineers are in great demand. Many are acquiring necessary knowledge through spare-time study of this modern I. C. S. Course on Diesel engines. Free booklet!

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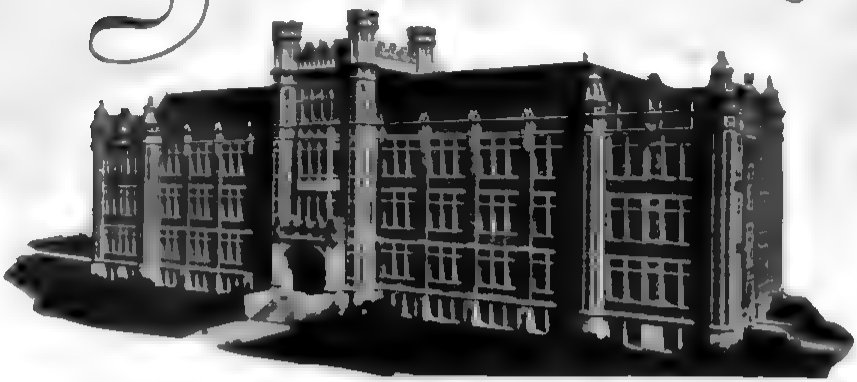

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- ☐ Telegraph Engineer
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- ☐ Mechanical Draftsman
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NEW "7-POWER" ALE YEAST ADDS 5 TO 15 LBS. *QUICK*

Richest imported ale yeast now concentrated 7 times with three special kinds of iron in pleasant tablets

AN AMAZING new "7-power" yeast discovery is putting pounds of solid, normally attractive flesh on thousands of "skinny," run-down people who never could seem to gain an ounce before.

Doctors now know that the real reason why great numbers of people find it hard to gain weight is that they don't get enough Vitamin B and iron in their daily food. Now scientists have discovered that the richest known source of health-building Vitamin B is ale yeast. By a new process the finest imported cultured ale yeast is now concentrated 7 times, making it *7 times more powerful*. Then it is combined with 3 kinds of iron in pleasant little tablets called Ironized Yeast tablets.

If you, too, are one of the many who need these vital health-building elements, get these new "7-power" Ironized Yeast tablets from your druggist at once. Day after day, as you take them, watch flat chest develop and skinny limbs round out to normal attractiveness. Indigestion and constipation from the same source quickly vanish, skin clears to natural beauty—you're an entirely new person.

Results guaranteed

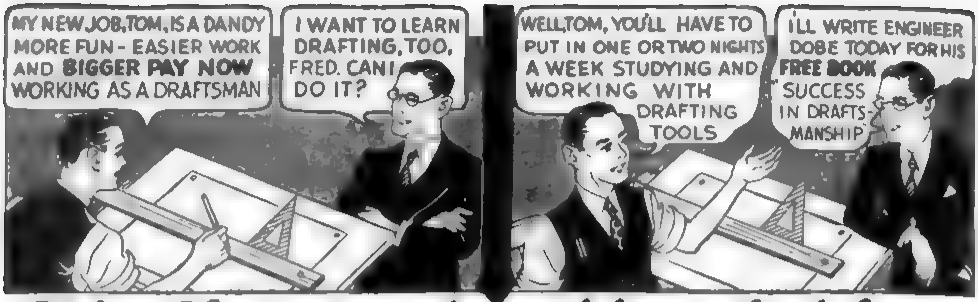
No matter how skinny and rundown you may be, try this new "7-power" Ironized Yeast for just a few short weeks. If not delighted with the results of the very first package, money back instantly.

Only don't be deceived by the many cheaply prepared "Yeast and Iron" tablets sold in imitation of Ironized Yeast. These cheap counterfeits usually contain only the lowest grade of ordinary yeast and iron, and cannot possibly give the same results. Look for "IY" stamped on each tablet.

Special FREE offer!

To start you building up your health right away, we make this absolutely FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results guaranteed with the very first package — or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 502, Atlanta, Ga.

Posed by professional models



Then Tom, too, learned by mail at home

Illustrating assumed case.

THE boom in building and other industries now seems well on the way!

Who is always needed first of all? The draftsman who draws the plans. *After* that, the steel mills, lumber mills, brickyards and others make their sales.

Government efforts to help are making things hum. In one factory town, a shortage of draftsmen is already reported. Many trained draftsmen will be needed—at better pay and shorter hours.

Who'll get those good jobs? Of course, the men who have prepared—so, prepare now!

Prepare, for

Better Jobs Now

are ready and more expected soon in auto work, aviation, electricity, machinery and certain building lines.

For those who learn drafting now!

It's the way for a quick start to a better paying, much bigger job. Send *at once* for Engineer Dobe's Book.

Free Book

HERE is an opportunity that's open to those who know how to grasp it:—

At a few dollars a month, students get complete training in drafting by mail in surprisingly few months—Engineer Dobe teaches his students until thoroughly trained and until placed in a good paying job. Trained Draftsmen enjoy good salaries. If you don't get a satisfactory job:—all your money back. That's Engineer Dobe's guarantee.

With Engineer Dobe's method no previous experience is necessary. High School education not needed. Everything made plain. Practical work right from the start until you're in position.

If you're a mechanic, a knowledge of draftsmanship may make you a superintendent in short order. Get out of overalls and draw the pay of a boss. If you *are* a boss, learn draftsmanship; a *foundation* stone of many a line of business.

In every walk of life, practical training in draftsmanship will prove valuable. Even if you never accept a job as a draftsman, will you not be *money ahead* by taking Engineer Dobe's course?

You'll be amazed at the speed with which you can learn in your spare time by Engineer Dobe's *practical method.* Send coupon TODAY for free book entitled "Success in Draftsmanship".

DRAFTING FROM AN ENGINEER

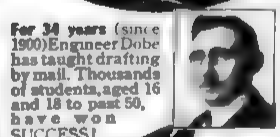
LEARN BY MAIL AT HOME

Outfit 20x25 in.

These TOOLS *and* EQUIPMENT

Time is money. Learn drafting in your spare time. It's high time now to prepare. Don't wait another day. *Send coupon for Dobe's free book.*

For 34 years (since 1900) Engineer Dobe has taught drafting by mail. Thousands of students, aged 16 and 18 to past 50, have won SUCCESS!



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Write NOW while this offer lasts.

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Send me your free book, "Successful Draftsmanship" and please explain how you assist your graduates to good positions as draftsmen.

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WHAT A BUILD! He's *Twice* as Handsome as He Used to Be!

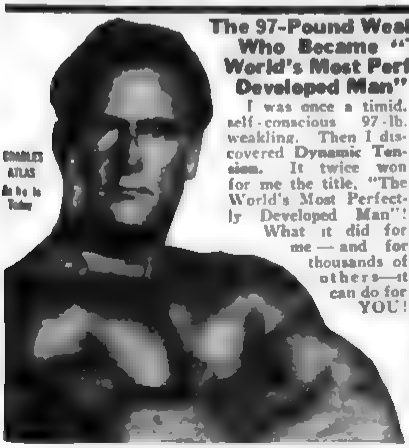
AND not long ago they were calling him "weakling"! People made fun of him. When in a bathing suit he couldn't get into *deep* water fast enough. Always embarrassed, timid, self-conscious, ashamed of his appearance.

NOW he's *husky, healthy, happy*—self-confident, popular everywhere. He's broad-shouldered, powerful, upstanding—with strong rippling muscles which clothes *cannot* conceal! His bad breath and constipation are things of the past. His eyes sparkle—his cheeks have the ruddy glow of HEALTH.

People are magnetically attracted by the fellow with a manly body. They are "drawn" to him. He gets the center of the stage. Everyone looks up to him—wants to know him. Others "fade out" when he is around.

I'll PROVE *in the First 7 Days* I Can Make YOU a *NEW MAN*

I'LL give you PROOF in even the first 7 days that I can turn you, too, into a man of might and muscle. Give you a build that women admire and men envy. Vigorous health that resists sickness, ends pimples, constipation, other troubles! If you are underweight, I'll add pounds of solid, healthy muscles right where you need them. If you are flabby, I'll show you how to pare down to fighting trim quickly. It's fun to let Dynamic Tension work. Without contraptions that may strain your heart or other vital organs!



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I was once a timid, self-conscious 97-lb. weakling. Then I discovered Dynamic Tension. It twice won for me the title, "The World's Most Perfectly Developed Man"! What it did for me—and for thousands of others—it can do for YOU!

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Solid sterling silver cup 14 inches high. I will award it to pupil who makes most improvement in next 2 months. No matter what your measurements are now, you have equal chance to win this cup—with YOUR name engraved on it!

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My Free Book tells about my amazing 7 DAY TRIAL OFFER and how my Dynamic Tension method has made big-muscled men out of run-down specimens. It shows you, from actual photos, how I have developed my pupils to the same perfectly balanced proportions of my own physique. What my system did for me and hundreds of others it can do for you too. Don't keep on being only half the man you CAN be! Find out what I can do for you. Where shall I send your copy of "Everlasting Health and Strength"? Mail the coupon today. CHARLES ATLAS, Dept. 6-B, 115 East 23rd Street, New York City.

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I want the proof that your system of Dynamic Tension will make a new man of me—give me a healthy, husky body and big muscle development. Send me your free book, "Everlasting Health and Strength."

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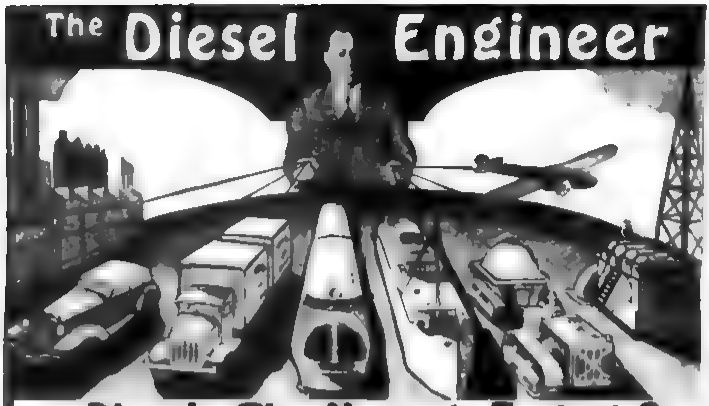

Is Your Job Safe

Just as the gasoline engine changed or wiped out the jobs of thousands who depended on horse-drawn vehicles for their living—just as electricity changed the entire set-up in the fields of light and power—so now the Diesel engine is fast invading both the power and transportation fields, and threatening the present jobs of thousands of workers.

If jobs in your line are steadily growing scarcer, you owe it to yourself to investigate this new, progressive, uncrowded line, that will offer good openings for many years to come.

Diesel—The Newest, Fastest-Growing Power

Diesel engines—because of their high efficiency, dependability, and economy of operation—are fast replacing steam and gasoline engines in power plants, motor trucks and [illegible] locomotives and ships, aircraft, tractors, dredges, drills, pumps, etc.—opening up an increasing number of well-paid jobs for Diesel trained men. The field of Diesel Engineering is on the upgrade and continually expanding. It will provide steady employment and advancement for those properly trained in this new industry—as long as they need to work.

You get complete information on all the latest Diesel developments—two- and four-stroke cycles, low- and high-speed and heavy-duty types, Diesel-electric generating systems, etc.—in our course. Includes all text material—with special diagrams for quick understanding of this new power.

Now is your chance to get into a big new industry and grow up with it to an important position. Today there is practically no competition in the Diesel field, but the increasing use of Diesel engines will result in keen competition for jobs in the near future. By starting your training now, you can keep ahead of such competition.

What This New Field Offers You

Get our Free Diesel Booklet and learn all about this newest, fastest growing line—its opportunities and requirements. Find out what the Diesel field offers you—how rapidly the Diesel industry has developed during the last three years—the large number of Diesel engines and accessories being manufactured today—how quickly you can obtain a complete understanding of Diesel engine principles and operation by home study during your spare time—without interfering with your regular work.

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Be the ONE Man In 1000 Who Can Service Modern Sets!

Modern circuits stump the old-time cut-and-try radio fixer. More puzzling complications are coming. Trained men with up-to-the-minute radio knowledge are urgently needed to service these new receivers. Such men easily make up to $3 an hour.

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Past experience counts for little at this time because changes in radio design are so swift and radical. That's why you, as an R. T. A. Certified Radio Technician can step right into the big money at once. Write today for full particulars.

EARNS $2.00 to $6.00 AN HOUR

I started a radio shop handling all kinds of radios and electric equipment. Since starting the shop, I have been able to earn from $2 to $5 an hour. I have built up a good reputation from sales and service work. Those satisfied customers have referred their friends to me and as a result I have all the business I can handle. R. T. A. sure opened my eyes to big money and I want to thank you for all you have done for me. My income is more than doubled what it was at the time I enrolled and I expect to earn still more.

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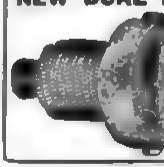

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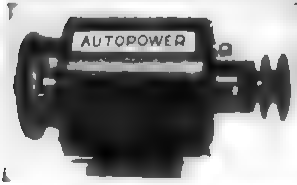

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How To Make MONEY with YOUR CAMERA

Big Demand for Photos YOU Can Take! Learn at Home—in Spare Time

DO YOU realize how many photographs are in this ONE issue of this ONE magazine? Multiply that by the *thousands* of publishers who buy photographs. THAT gives an idea of the pictures being bought EVERY MONTH!

WHO GETS the money paid for these pictures? YOU can get your share, no matter where you live or what you are doing NOW! Many of these pictures are supplied by *amateur* photographers—ordinary *non-professional* amateurs who have learned how to take pictures THAT SELL!

Make Good Money for Work That's Fun!

You don't have to be an expert to make money in this fascinating field! You don't have to live amidst the whirl of exciting daily news events. *You don't even need a special camera, or expensive equipment.* It is NOT *technical* ability that publishers pay for. It's the knack of knowing WHAT to photograph, HOW to photograph it, and WHERE to sell it, that brings in the money! It's SALABLE and MARKETABLE pictures—full of human interest and popular appeal—that you must learn how to produce . . . not technically beautiful examples of photographic genius! Send for FREE BOOK which tells all about the simple training which quickly prepares you, right at home, to make pictures that SELL.

$50 FOR HIS VERY FIRST WORK

Well known magazine paid L. D. Eldridge, of St. Paul, Minn., $50.00 for very first work submitted.

MADE $237 WHILE LEARNING

O. Hastings, of Dorchester, Mass., writes "Have added up how much I have taken in since I sold my first picture. I have made $237.50."

DAILY PAPER BUYS HIS WORK

"Sold my first picture to a daily paper. Also made contact with editor of a national magazine and am doing some work for him."—C. Warren, Jr., Woodmere, L. I.

"JUST STARTED—AND HAVE ALREADY MADE $32"

Louis Tager, who lives in Peiping, China, writes: "I have sold 6 pictures to N. E. A. Service, of San Francisco, 3 to Acme News Service, of N. Y., and 1 to Popular Mechanics!"

Gets 3 Checks In 1 Week!

York McClary of Belvidere, Ohio, says: "I have received 3 checks this week. Owe you a lot for starting me on this path."

Wins 6 Prizes—Sells 11 Photos!

"I won 6 contest prizes, sold 5 photos, had 6 more accepted."—H. D. Townsend, Monhegan Island, Me.

"Sold 7 Pictures at a Good Price"

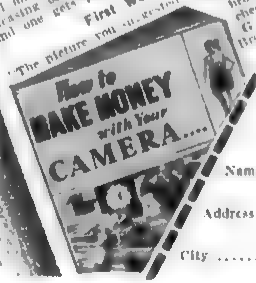
"Now plan devoting full time to work."—L. G. Burnand, Villa Pk., Ill.

"This Work Is Play—Yet Paid For"

"I have sold 3 photographs, expect to sell many more. Can't imagine a more pleasing occupation—where work is play and one gets paid for it!"—R. Lierle.

First Work Pays

"The picture you suggested for that national magazine brought me a check."—J. G. Newton, Brooklyn, N. Y.



FREE BOOK

Get your copy of "How to Make Money with Your Camera." Page 1 shows you the vast scope of the field. Page 7 tells the *kind* of snapshots that can bring you a good income. And on pages 12, 13, 14 and 15 are printed the pictures and letters of others who, even 4 or 5 weeks after enrollment, are already making good money.

This Is The Age of Photographs. Your own eyes tell you *that!* Your own camera can cash in on it! Read the reports here—from ordinary people who have always liked to do a little snapshot work—and who have NOW discovered a way to turn their hobby into money.

There's money in YOUR camera too! Mail coupon at once for this FREE BOOK telling you how easy it is to *get it out!*

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No Salesman will call

Raise Giant Frogs

A New, Uncrowded Industry

"Nufond Giants" weigh up to 3 pounds.

Good Profits—No Competition

Each pair of "Nufond Giant" breeders lay 10,000 eggs every year. With modern methods, up to 90% turn into frogs.

Giant frogs sell up to $5.00 per dozen everywhere. Think of the profit possibilities! Competition is unknown because the wild supply is practically exhausted.

10,000 Eggs from Each Pair

Backyard Pond Starts You

A small backyard pond 20x25 feet with a little bank space is all you need to start. The pond is very shallow; little water is needed. Expand with the offspring.

Any kind of drinking water is suitable. Running water is not required. Flowers, lilies and plants make the pond very attractive.

A model backyard frog pond

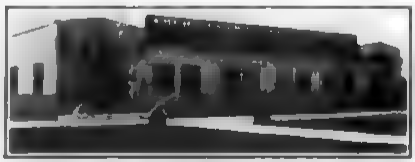
Any Climate Suitable

"Nufond Giants" are a hardy breed of "North American" bull-frogs. You can raise them in the North or South, even in Canada.

Costs Little to Start

A frog pond is easy to make. There is nothing to buy except fence! You even raise the food right in the pond with the frogs! What other livestock offers you such advantages?

WORLD'S LARGEST FROG MARKET



THIS IS THE BEST TIME TO START

As originators of canned frog legs, we have developed the largest market for frogs in the world. Our products are on sale in principal cities throughout the country.

FREE BOOK

WRITE for our big, illustrated frog book. It explains our money-making proposition in detail.

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A. L. G., Conn.

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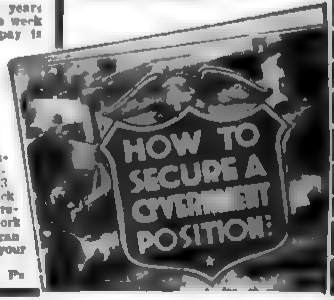

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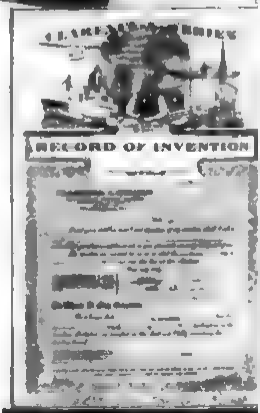

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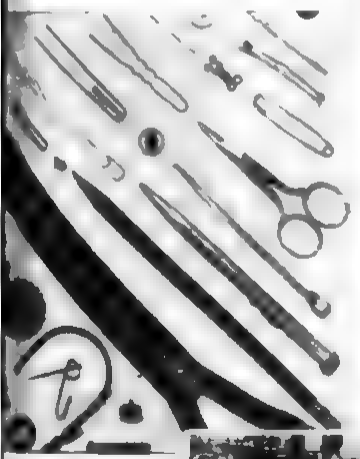
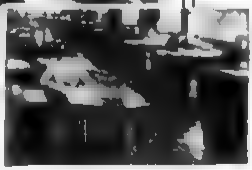


...partial view of our drafting and specification rooms where a large staff of experienced experts is at your constant employ.



CLARENCE A. O'BRIEN

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Random Chips from

OUR office faces the Boston Post Road in picturesque Connecticut. It is a highway that has a romantic historical background dating as far back as the Colonial period and remains today as one of the most popular motor roads in the country.

As we sit here and watch the constant stream of traffic, we are impressed more and more with the importance of the gasoline engine in American life. Passenger cars of every conceivable make whiz by huge rumbling trucks, the behemoths of modern transportation.

Standing out among the automobiles, like roses in a weed patch, are the new models of 1936. Their streamline beauty, their fast getaway, their low, strong, shining bodies, large, clear-vision windows, and the ease with which their drivers handle them—these and a lot of other features make us realize why the new cars have become so numerous in this traffic parade. There's another reason why we know that practically all makes of 1936 cars are fast sellers. Among the trucks passing by are those long skeleton-like affairs on which distributors pile automobiles like children playing with toys. Those trucks, rushing new automobiles to anxious customers, are the barographs of motor car sales.

Curious to discover additional reasons for the popularity of the new models, we asked Donald Cooley to go around and peer into them. He found a lot of unusual gadgets and practical devices that are making the 1936 automobile safer and easier to drive than ever before. The results of his survey can be found on page 52.

***

No. 1 prize, a $5.00 check, in this month's Workbench contest goes to Arthur S. Goodwin who sent us photos of two *Sunrays* and this letter:

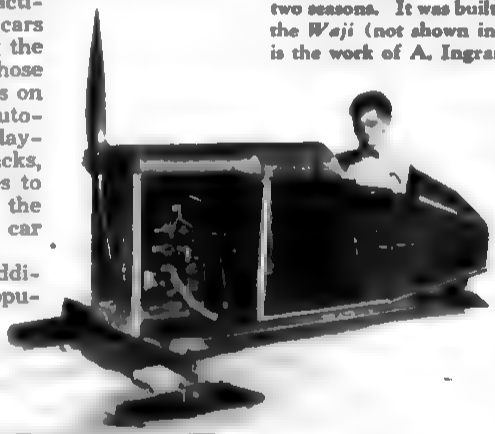
Port Stanley, Ont.

Dear Editor:

Here are some photos which illustrate what can be done from your helpful plans. These two boats are from a fleet of four of this class which are owned locally. Seven altogether have been built here. The *Albatross* has been a consistent winner in her class for the past two seasons. It was built by H. Jamieson, while the *Waji* (not shown in the photo published) is the work of A. Ingram and J. Willgoose.

These boats compete regularly against all types of boats and have become recognized leaders in small boat divisions. At one time I built and sailed one myself and have assisted in the construction of others.

Arthur S. Goodwin.



Charles Burval's photo of ice sled (right) took second prize of $3.00 this month. Motorcycle engine drives the four-foot propeller.

The ground trainer at left has wing spread of 12 feet and motor converted from air compressor. Built by Neal Loving, it was awarded third prize of $2.00. Right—Jackson Young of Barberton, Ohio, with his complete file of MM from November, 1928, to date. He says: "Having all these copies and the Flying Manuals, speaks for itself what I think of the magazine."

the Editor's Workbench

Sunray stands among the first of MM home-built boats. Because of its popularity, plans and instructions for building it were included in the new edition of HOW TO BUILD 20 BOATS, now on sale for 50 cents at most newsstands.

***

Flowers received from E. G. Potvin of New York City: "Many moons ago your publication *How to Build 20 Boats* appeared on the news stand at 10:00 a.m. At 10:01 a.m. I had a copy. It has assumed the importance of No. 1 book in my collection of data on boats. I figure I know about every plank size that would be used in building the whole lot."

We wonder if Potvin is now digesting twenty new boat designs in the new edition of *How to Build 20 Boats*. He probably got his copy at 10:01 a.m. on November 22, the day on which the new book went on sale.

***

Charles K. Burval of Des-Plaines, Ill., remembered from past experience that a magazine's material is usually prepared about two months earlier than it appears on the newsstands. He sent us a photo of an ice sled, that he built last year, early enough to take second prize of $3.00 in this month's contest. He writes:

DesPlaines, Ill.

Dear Editor:

I am enclosing a snapshot of my new ice sled. It is eight feet long and has a 5-foot centering between runners. Powered by a Harley 61 cu. in. motor, it propels a four-foot prop with very much gusto. All the controls are on the dash.

I am sending the snapshot in early this year in hopes you may find room to print them. I sent in some pictures last year only to find that it was too late for winter sports, this being much to my surprise.

Charles K. Burval.

A blizzard may be raging while you are reading this, but at the same time MM's editors are thinking of boats, fishing, camping, gardens and other spring subjects. Take a hint from Burval and submit your photos a season ahead of time, if possible. This is an especially good tip for those of you who are submitting handikinks or other how-to-build articles to the editorial department.

Albatross, a Sam Rabl *Sunray*, built by H. Jamieson, was winner of the Kenagio Yacht Club, Canada, 12 square meter class division in '34 and '35. Arthur Goodwin submitted the photo and won first prize of $5.00.

***

"I bought one of your Radio Builders' Manuals. I find it worth the price, very interesting, and helpful for a beginner. When does the next edition come out?" asks R. E. Sparkes, Fairbank, Ont.

***

They say that the amateur light plane builders have been ruled off the map, but from letters and photos received here, indications are that they are still going strong. For example, here is Neal Loving's letter, winner of third prize of $2.00:

Detroit, Mich.

Dear Editor:

Enclosed is a picture of my ground trainer which was completed a few months ago. It has a span of 12 ft. and weighs about 65 lbs. It has supported 190 lbs. in the cockpit without damage. The engine was converted from an air compressor and runs satisfactorily although a little rough due to improper balance. It has never been tested, but I believe it capable of short flights. Although it has a plywood fuselage and regular fabric covered wings the

[*Continued on page* 30]

MOULDING A MIGHTY ARM

A SPECIAL COURSE ON ARM BUILDING

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WHY not get an arm of might with the power and grip to obey your physical desires? I have taken weaklings whose arms were scrawny pieces of skin and bone and in a short time developed them into strong men of powerful proportions with bulging biceps and brawny forearms—arms—solid arms of power that are respected by men and admired by women.

This course is partially planned to build every muscle in your arm. It has been scientifically worked out for that purpose. Many of my pupils have developed a fine set of triceps shaped like a horse-shoe and just as strong and a pair of biceps that show their double head formation. The sinewy cables between the biceps and elbow are deep and thick with wire cable like ligaments. The forearm bellies with bulk, the great supinator lifting muscle, become a column of power, and their wrists are alive and writhe with cordy sinew.

Send 25c for this course today. Why not start now to build a he man's arm?

You can't make a mistake. The assurance of the strongest armed man in the world stands behind this course. I give you my secrets of strength illustrated and explained as you like them. Mail your order now while you can still get this course for only 25c.

I will not limit you to the arm. Try any one of my courses listed in the coupon at 25c. Or, try all six of them for only $1.00

RUSH THE COUPON TODAY!

Mail your order now and I will include a FREE COPY of "NERVES OF STEEL, MUSCLES LIKE IRON." It is a priceless book to the strength fan and muscle builder. Full of picture of marvelous healed men who tell you decisively how you can build symmetry and strength the Jowett Way. Reach Out . . Grasp This Special Offer!

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- ☐ Moulding Mighty Legs, 25c
- ☐ Strong Man Stunts Made Easy, 25c
- ☐ All 6 Books for $1.00

*Name*_____ *Age*_____

*Address*_____

Chips from the Editor's Workbench

[*Continued from page 29*]

John Newumann of Wood Lake, Minn., builds tractor models of redwood to 1 10 scale. The work is done by hand carving, sawing, and lathe work. It takes 50 hours to build a model.

total cost amounted to only about thirteen dollars.

Neal Loving.

How many readers would be interested in building a similar ground trainer. Drop a postcard to the Workbench and, if the vote is heavy enough, possibly Loving will supply the plans.

***

Remember in submitting photos to the Workbench, your letter must state which feature or department in the current issue you liked best and which interested you the least.

***

Why editors get gray hair:—E. R. Martin of Toledo, Ill., writes, **The October number is worth three times what I had to pay for it. Let's have more and more photo hints. Why not have an amateur photographers' sections.**

But Alton Kruger, of Detroit, Mich., declares, **"I like your articles on boating. The ones that do not click with me are the photography articles."**

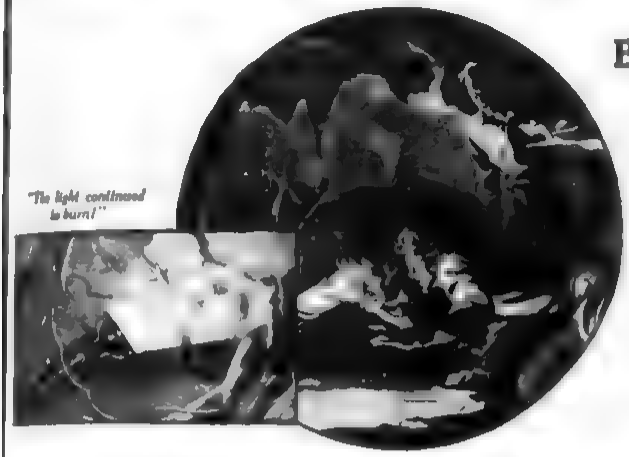
It's all in the game, though, and we are anxious to know how you stand.

***

E. Wilson, of 354 S. Elm St., Kankakee, Ill, postcards: **I have been a reader of your magazine since 1928. I have built the outboard race *Hedake*, the cruiser *Lark, Jr.*, and a kyack of my own design. I have built two iceboats for other fellows. Boat fans please write.**

Another MM veteran, Raymond Murray of Corning, N. Y., writes: **I think your magazine is very interesting and easy to understand. I have bought it since November, 1928, and have every issue except February, 1929.**

FATE Led Them to a Living Tomb!



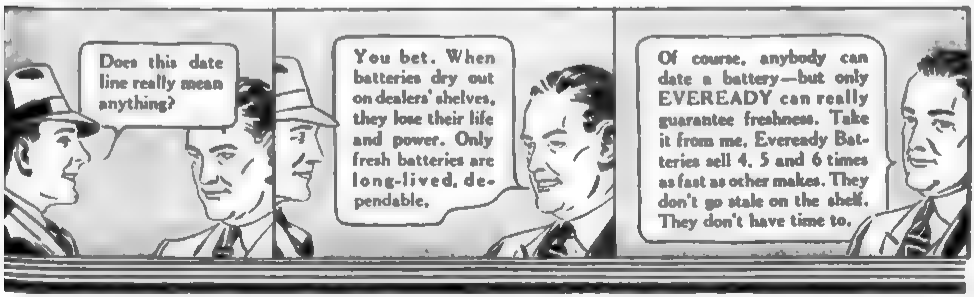
But Edward Eiskamp and Six Companions Cheated Death in Underground Maze

Edward Eiskamp who, with six companions, had this thrilling experience in the Sam's Point caves in the wilds of the Catskills.

"*Splash* . . . our tiny rock-bound world went black! I had dropped our flashlight into a pool of icy water at the very bottom of that cavern-maze that burrows for miles in every direction under the Catskills. Without light, here was our living tomb. In weeks or months or years someone would find seven skeletons in this crypt.

"But the light continued to burn. Up through eight feet of water came the bright halo of hope. We fished up that flashlight, and those powerful *fresh* Eveready Batteries lighted our way back from Eternity."

EVEREADY BATTERIES
ARE *FRESH* BATTERIES
ONE REASON WHY THEY LAST LONGER



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Railway Postal Clerks

City Mail Carriers, Post Office Clerks

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"On my V-8 Ford, it works miracles. Its added power, acceleration and top speed has sold me. The results are unbelievable."—*Ralph Fields, Mass.*

"Very glad to say, the Buick showed an increase of 5 miles more per gallon."—*A. V. Grove, Washington.*

"On my Plymouth, I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of $15 a month or $180 a year."—*F. E. Peck, Calif.*

"It saves me one gallon a day. I had to buy 5 gallons each day—now only 4 gallons."—*L. V. Sweet, Pa.*

"My Chevrolet certainly runs smoother, has more power and snap to it since I put the Vacu-Matic on."—*J. E. Nelson, Minn.*

"On my Dodge 8 I am getting 6 more miles per gal., with more power and pick-up, which is all anyone could ask."—*Lee D. Esty, Calif.*

"I have twelve Vacu-matics on cars now, and they all show an increase in mileage. The car owners are very well pleased."—*Fred Taylor, Okla.*

"I averaged 25 miles per gallon on a trip with a model A Ford at 40 miles per hour, where before I only averaged 20. Also better pickup and smoother running.—*Wm. Lyons, Calif.*

"I have been placing Vacu-matics on expert mechanics' cars. All are well pleased."—*J. W. Donahoe, W. Va.*

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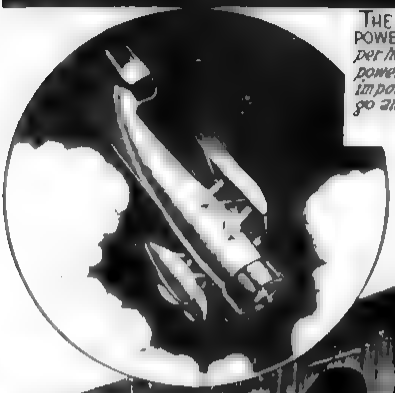
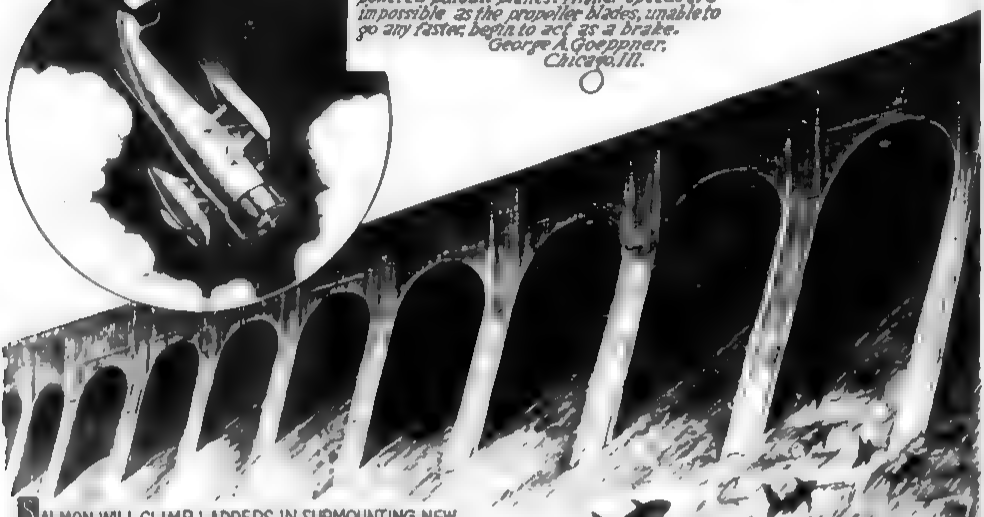
SALMON To Climb Ladders Over Dams Says NIC SPRANK in Oddities of Science

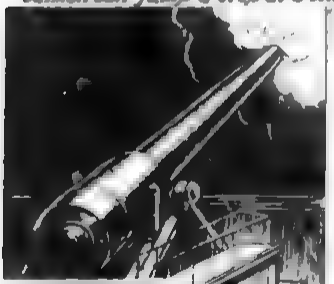


THE PROPELLER HOLDS THE SHIP BACK IN POWER DIVES! — *Power dives of 300 miles per hour have been attained by Boeing Wasp-powered pursuit planes. Higher speeds are impossible as the propeller blades, unable to go any faster, begin to act as a brake.* George A. Goeppner, Chicago, Ill.

Nic Sprank



SALMON WILL CLIMB LADDERS IN SURMOUNTING NEW GOVERNMENT DAMS! — *Salmon, in response to some unknown instinct, overcome enormous obstacles to return to spawning streams high in the mountains, but such barriers as the Bonneville and Grand Coulee dams would be insurmountable. As a result fish ladders will be built over which the salmon can jump a step at a time.*



MODERN 16 INCH GUN IS UNFIT FOR USE! — *A high powered projectile passes through the gun barrel in slightly less than 1/100th of a second. After 200 rounds have been fired, the barrel must be rebored.* L. Mikulski, Jersey City, N.J.

A GIANT OAK TREE OWNS ITSELF! — *In Athens Ga., Col. W. H. Jackson, in a deed made 42 years ago, gave the tree ownership of itself and 12 feet of ground surrounding it because of the affection he had for its sturdy trunk. The tree still stands.* - J. F. Dopak, Chi.

Win $1 Send your Oddity to Nic Sprank, Modern Mechanix Publishing Company, Fawcett Bldg., Greenwich, Conn. Source or proof of each Oddity must be given. Send all Oddities seperately, not with other manuscripts or letters.

Precious Radium is Medicine's Teacherous Helper

Rare metal is teamed with common lead to become an ally of science.

Weird masks impregnated with lead shield this doctor from the withering rays of radium held in the tiny vial. These same rays become healing agents when they are properly directed.

Left—This solid lead container protects hospital attendants who transport radium. Above—Guarded by a lead shield containing thick lead glass, a nurse restores a vial of radium to its holder. Right—Lead vaults for radium. Box marked 100 contains one-tenth of a grain of radium. It is worth $7,500.

Lead is the only thing radium rays will not penetrate, and without a lead shield, this interne must work at a distance. Right—Radium is now valued at $1,000,000 an ounce. It looks like a white salt, and each grain must be well guarded

Flying the 50-TON

Here is the giant 19-ton S-42 the Sikorsky Clipper which made the pioneer flights over the Pacific air route. In one test flight in this ship, Capt. Sergievsky broke eight world records. The plane carried a payload of 16,600 pounds, equivalent to 93 passengers. Built at a cost of $1,000,000 each, the ships are being used over routes to South America and are known as the Brazilian Clippers.

Capt. Sergievsky smiles before closing the hatch and taking off on a test flight in a twin-engined amphibian, fastest commercial flying boat in the world.

by **CAPT. BORIS SERGIEVSKY**

Chief Test Pilot, Sikorsky Aircraft Corp.

AT MY finger tips—the throttles, soon to unleash 3,000 horses. Underneath my seat—40,000 pounds of fabric, wood and alloy metals. In the cabin, surrounding me and my assistants—90 instruments, each telling at a glance part of the composite story of performance.

As I sit in the upholstered pilot's seat I look out at the three-bladed props ticking over in the afternoon sun, and wonder: "How will she fly?"

Test flying a 20-ton flying boat is like no other job in the world. I do not put the mammoth craft through thrilling evolutions, such as long dives and spins, but I do give her a thorough workout. For it is my job to make sure each new ship is air worthy, that she will carry her cargoes of humans and goods long distances with safety.

These will be bigger Clippers, too. These planes seem large as compared with the liners seen daily plying the air lanes from coast to coast, but larger flying boats will appear in the near future. In the S-43 we have found an amphibian which makes no concessions in performance or efficiency to land transports. Here for the first time the world witnesses a commercial amphibian capable of a speed of around 200 miles an hour.

In great 100,000-pound planes of this kind, powered by six or eight engines, passengers one day will be crossing the Atlantic on daily flights and flying across the Pacific on regular schedule.

Nor will that be the ultimate limit. Cost and economical operation only stand in the way of ocean air liners weighing from 150 to 250 tons, great planes many times larger than the present Clipper ships, amphibians or flying boats which would fly 5,000 miles without landing for fuel and carrying 100 passengers in less than a day from America to Europe.

In any event, I hope it will fall to my lot to test fly these great super-Clippers, if and when they are developed.

[*Continued on page* 38]

Pacific CLIPPERS

This 25½-ton Glenn Martin flying boat is the second China Clipper, regular transport ship on the Pacific airway. It is the forerunner of even larger ships. Map shows route. Below—Postal cancellation used on first Clipper mail.

CAPTAIN MUSICK—PIONEER PILOT

Captain Edwin Musick, pilot of the China Clipper on its inaugural flight, holds ten world's records, more than any other flier. On October 19 1927, he was pilot on Pan-American's first scheduled flight in a tri-motored Fokker from Key West to Havana, 90 miles. Since then the company has grown to be the greatest airline in the world and Capt. Musick has been at the controls of the first ship to take off on each new airway. He has been flying for 22 years and has never had an accident. He made his first flight in a homemade plane that rose nine feet before crashing.

CHINA CLIPPER DIMENSIONS

Gross Weight	51,000 lbs.
Weight Empty—	
As mail transport	23,100 lbs.
As passenger ship	23,316 lbs.
Load for Ocean service	22,784 lbs.
Wing Span	130 ft.
Overall Length	89½ ft.
Overall Height	24 ft.
Power	3,200 h.p.
4 Pratt & Whitney 14-cylinder Wasp Engines of 800 h.p. each.	
High Speed	179 m.p.h.
Cruising Speed	157 m.p.h.
Range	3,000 to 4,000 miles

HISTORY OF THE FLYING CLIPPERS

In 1931 in an office in a New York City skyscraper three men pored over plans for an aerial trade route across the Pacific Ocean. They were Col. Charles A. Lindbergh, the line's technical adviser, Juan Trippe, president of Pan-American Airways, and Andre Priester, the line's chief engineer. Four air routes across Europe were reaching out for the ten billion dollar trade of the Orient, but America still was twenty-eight days away by steamer.

The route was charted from California to China across a series of islands, Hawaii, Midway, Wake, Guam, and the Philippines, possessions of the U. S. But at that time no seaplane had been built that could fly the 2,410 miles between San Francisco and Hawaii with even a safe fuel reserve, let alone a paying commercial load. Manufacturers queried on the problem said it was impossible to build a seaplane that would carry enough fuel for 3,000 miles at a cruising speed of 150 m.p.h. in addition to a payload of mail, passengers and express.

Igor Sikorsky, however, agreed to build three 19-ton flying boats in 1932. In tests last summer his ship broke ten official international records for large seaplanes. Two of the ships immediately went into service on the eastern sea route from Florida to South America and are known as the Brazilian Clippers. The third was fitted into a laboratory for the pioneer Clipper flights across the Pacific. Captain Edwin C. Musick commanded the first two flights and on succeeding flights turned over the controls to various members of the crew, consisting of co-pilot, navigator, radio officer, and flight engineer, all of whom must know how to fill any post in an emergency.

Preceding the pioneer Clipper, was steamship North Haven which carried men and supplies to establish air bases at Midway, Wake, and Guam.

Meantime, Glenn Martin was building three 25 1/2-ton ships, destined to be the China Clippers, regular airliners on the Pacific route. After three years under construction in the factory, the first ship, the largest flying boat ever built, took off from Alameda, Calif., for the Philippines, 8,000 miles away, on the first formal flight of the new airline. The ship carried 110,000 letters weighing almost a ton for stamp collectors.

The 8,000-mile route was covered in six days. The actual flying time was sixty hours or two and one-half days. On the Wake to Midway leg of the return flight, the China Clipper passed the Orient-bound Boeing Clipper which left San Francisco on the same day as the flying boat. The round trip was made in 122 hrs. 42 mins. Later the air route was to be extended to China, making it possible to fly around the world.

Giant China Clipper Carries 10-Ton Load

The Sikorsky, S-43, newest amphibian test flown by Capt. Sergievsky, is first large commercial plane of its type to achieve speed of 198 m.p.h. It will be used in the Hawaiian Islands.

Before I take any new seaplane into the air, I make extensive taxi-ing tests, executing slow and sharp turns, down, across and upwind. I speed the ship along the surface until she climbs up on the step ready to take off, but do not permit the hull to clear the water.

My job is confined to handling the ship. Naturally I cannot attend to all the necessary tasks. A crew of possibly six engineers accompanies me during taxi-ing runs, observing the hull for leaks, side floats and other parts for excessive vibrations, connections of wings and tail surfaces—in brief, all parts which might develop ailments.

Piloting any flying boat, no matter how large, is much like piloting a trim racing boat. You get up speed until she's on the step. At that moment the suction is broken, and you can get away quickly. I have flown a lightly loaded 19-ton boat of the S-42 type off in less than seven seconds. With a load of more than 19 tons, she took off in 18 seconds, after a run of only 800 feet. That gives you an idea of the tremendous power poured out by the Hornet engines, and the cleanness of her design.

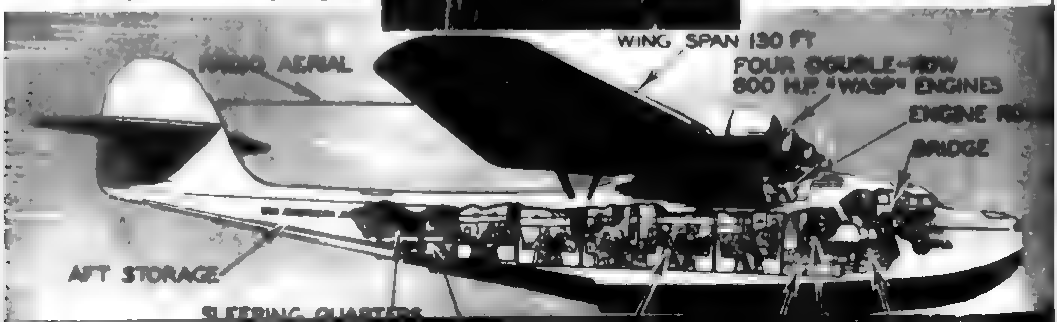
Although we cannot know how a giant flying boat will perform until she finally takes to the air, we do know through careful engineering that she is inherently stable. For instance, by weighing a plane on three scales we know where the center of gravity is located, but the reaction of the airflow on the stabilizer, that is, whether it will cause the ship to be nose or tail-heavy, cannot be known until we are actually off the water.

Contrary to testing mili-

[*Continued on page* 134]

Below—Diagrammatic view of the China Clipper. As a sleeper it accommodates 18 passengers, crew of 7, and cargo. As day transport, Martin seaplane carries 43 passengers.

Left—Capt. Musick (left) pilot and R. O. D. Sullivan, co-pilot, in the control cabin of the Sikorsky Clipper which made trans-Pacific experimental flights, before airline started.



Chemicals Worth $2,000 a Pound Produced from Dry Cheese

RARE chemicals worth more than $2,000 a pound are being manufactured at the University of Southern California from dried cottage cheese, gelatin, dried blood and other substances by Dr. Max S. Dunn, an associate chemistry professor, and Amos Butler, a graduate student.

The costly amino acids are being sold to hospitals, research laboratories, and other institutions in minute quantities for use in tests involving the function and growth of the human body.

More than fifty students are assisting Dr Dunn and his associate in preparing the chemicals for distribution. Every vial of the valuable protein product is subject to careful examination under a stereoscopic photo-micrograph to insure its meeting of the high standard set for it in its manufacture.

Since the amino acids contain such abundant units of the scarce protein its value cannot really be measured in dollars and cents. The success of Dr. Dunn's findings will make the chemical available to everyone.

Dr. Max S. Dunn is shown before a stereoscopic photo micrograph examining a vial containing some of the rare amino acids which he has succeeded in producing from dry cheese.

Greatest Ski Trestle 600 Feet Long

This ski trestle, most spectacular ever built, offers American skiing fans a thousand thrills when the Eastern Ski Associations meets for its annual ski contests at Littleton, Mass.

THE world's longest ski trestle, offering a thousand thrills, has been constructed at Littleton, Mass., at a cost of $20,000. It will be used for the Eastern Professional Ski Associations' contests this winter. The jump is more than 600 feet from bottom to top with a 60-foot gap in the center. The skier leaves the platform 684 feet up the hillside, slides 409 feet to the jumping off place, then across the gap to the 275-foot landing trestle.

The giant trestle is the most spectacular ever built in this country and one of the most dangerous in the world.

New Plane Free from Air Hazards

A NEW streamlined Curtis-Wright airplane, that is stall and spin proof, has been designed for entrance in the safe plane contest to be conducted by the U. S. Department of Commerce. The plane has a top speed of 131 miles per hour and can land at 40.

Wings are equipped with slots and flaps which, with an ingenious aileron control, make the plane practically free from any danger that might be caused by stalling or tail spinning.

Said to be free from dangers of stalling and tailspinning, this new type of streamlined airplane is the industry's latest addition to light planes seeking to popularize private flying.

Sun Ray Machine Develops 50,000 Degree Temperatures

H. E. McCoy, inventor of thermo-machine stands before three of the heat collecting units. Each stores enough heat from the sun's rays to produce 1,500 degree temperatures.

TEMPERATURES never before attained by man are now possible with solar heat machine invented by H. E. McCoy of Harbor City, Calif. Constructed in banks of 1,500 degree units, each connected to standard automatic controls, the thermo-machine is capable of developing temperatures up to 50,000 degrees.

The inventor believes that many industries will be revolutionized by use of the device since it may be used to operate all electrical appliances, smelt ore, super heat steam turbines and run air conditioning equipment.

"Skidding Machine" Tests Highways

A MOTORCYCLE and sidecar of freak construction has been built for the British Ministry of Transport by the Department of Scientific and Industrial Research for use in testing highway surface traction.

The vehicle's wheels are mounted in such a position that they produce a constant skid so that delicate dynamometers, carried in the sidecar, may record the tractiveness of the various highways.

On highways where the car skids excessively the dynamometers' charts show unusually high readings. These roads are then resurfaced or condemned to traffic.

To protect its motorists against accidents this queer motorcycle, which tests and records the surface traction qualities of highways, was built by the government of Great Britain.

Midget Auto Propelled By Foot

Fashioned after both bicycle and automobile this three-wheeled, foot-propelled, car develops speeds up to 15-miles per hour. It has won over many former bicycle

THE newest thing in sports is the Aerocycle, a curious little pedal propelled car that is fast winning the approval of former bicycle addicts.

Constructed of steel tubing, the device can be operated without any previous experience. Steering is controlled by a cable arrangement running to the wheel in the rear. The car is propelled by a front wheel chain drive operating in the same manner as the familiar bicycle coaster brake.

Prehistoric Rhinos Found In U. S.

FOSSILS of strange prehistoric even-toed mammals, small rhinoceros and rodents that roamed North America more than 30 millions years ago were recently discovered in the Armargossa desert by scientists of the California Institute of Technology under the direction of Dr. Chester Stock.

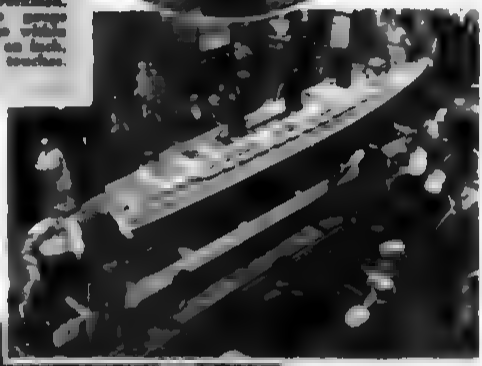
Small Queen Mary Represents Triumph In Model Making

MODEL making on a gigantic scale, and yet model making so delicate that measurements must be made to within 1/50th of an inch, is evidenced in a lifelike replica of the *S.S. Queen Mary*, built in England and now touring the United States.

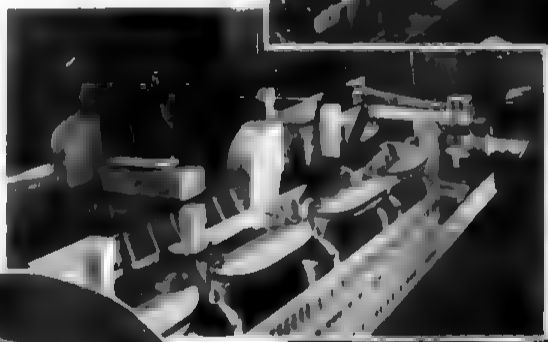
Although built to a scale of but ¼ inch to the foot, the model measures 21½ feet from stem to stern, with a beam of 2½ feet. Into her construction went nearly 2 miles of deck lining, 1,600 port holes and 214 windows, all made by hand. Nearly 2½ tons of lumber of the finest sort was selected for the hull and superstructure.

Thirty skilled craftsmen united their talents to complete the model in the record time of 10 weeks. In the metal shop winches, propellers, anchors, funnels and other fittings were either cast or wrought from sheet metal, then plated in bronze, silver, or gold. The thousands of tiny parts, from handrail knobs to lifeboat cans, were assembled in a glass lined room to avoid dust. The model is the largest ever made in England.

Skilled workmen, enclosed in garage compounds to avoid 1/50th of an inch, add final touches.

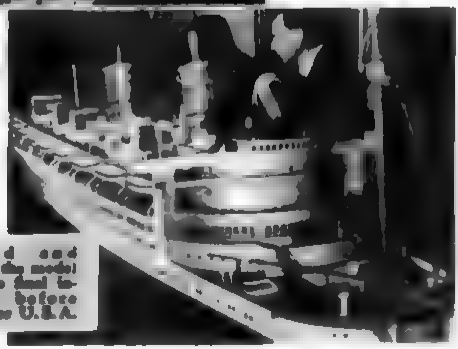


Below—Working on a scale of ¼ inch to the foot, these workmen begin the task of assembling the tiny units which make up the superstructure of the model *Queen Mary*. Even the thickness of the glue used must be taken into consideration.



Here is the model *S.S. Queen Mary* being loaded for shipment to the United States. Note her graceful lines.

This photo clearly shows the details of the boat deck and forward funnel. Thousands of parts must be found in a model of this size.



Painted and polished, the model workmen load in crates before leaving for U.S.A.

ENGINEERED SAFETY

The Triborough bridge—not just another bridge but a whole super-highway system; not just an engineering problem of stresses and strains, but a vast problem in traffic safety. Speed with SAFETY was the great problem, and how this was met is told in this comprehensive article.

Soaring 200 feet in the air, and with 70 more feet yet to be added, the Queens tower of the Triborough bridge gives New Yorkers their first concrete example of the magnitude of the project. Right—Perched perilously over East River, workmen place the last girder linking the 2 spans, always a tense moment.

MANHATTAN, the Bronx, Queensborough—these names conjure a picture of millions of busy people ever on the move; of countless automobiles, jolting trucks, red signals and traffic snarls.

The three boroughs — Manhattan, Bronx and Queens—make up the most teemingly busy area in the world. Yet they are separated, each from the other, by water. A traffic engineering problem that would be great enough were they adjacent to each other on land is rendered tenfold greater by barriers of tidal waters. The answer to the challenge of the swarming traffic and the turbulent barriers is—the Triborough Bridge Project.

Probably the most imaginative and far-flung conception in recent engineering is this mammoth structure. It is not merely a bridge It is an incredible 17-mile system of super-highways, long viaducts, ingenious traffic separations, and no less than four great bridges over four tidal waterways. As though this were not enough, the plan contemplates the development of two East River islands —Randalls and Wards—as city parks.

The cost of this prodigious improvement in

The Triborough bridge not only represents a monument to modern engineering; it stands for 18,000 man-years of employment. This steel man is but one of many thousands

on the TRIBOROUGH BRIDGE

by **W. A. SWANBERG**

A city famous for improvements was first estimated at 43 millions. When the final reckoning is made it will probably reach 60 millions.

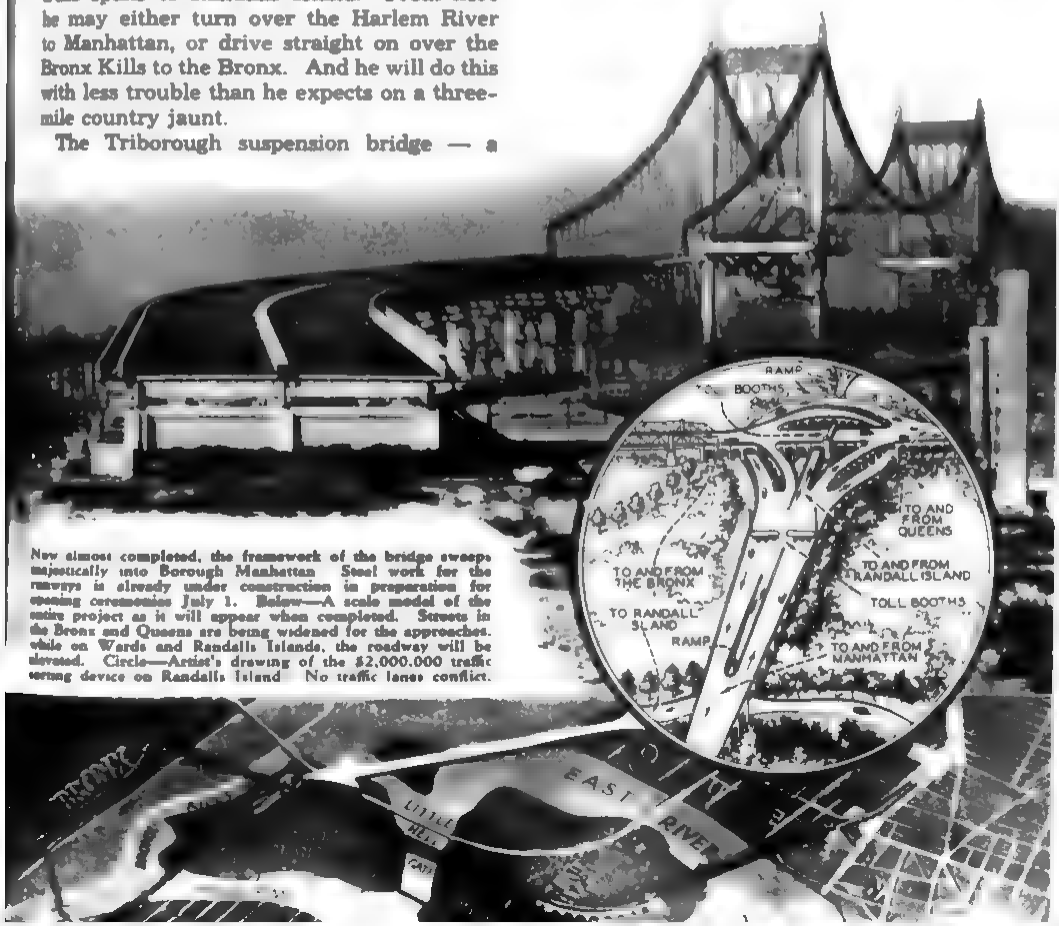
Is this expense vitally necessary? Replying to that question, Colonel Paul Loeser, director of the project, said, "Anyone who has tried to cross Queensborough Bridge at 5:30 of any evening has the answer imprinted firmly on his mind. The rush of cars, the traffic jams —these answer better than words."

The project, at the junction of the East and Harlem rivers, is now hastening toward completion by July 1. When the final speeches are made and the last ribbon severed, the liberated motorist will be able to whisk his car from Queens over a huge suspension bridge to Wards Island, over viaducts and truss spans to Randalls Island. From here he may either turn over the Harlem River to Manhattan, or drive straight on over the Bronx Kills to the Bronx. And he will do this with less trouble than he expects on a three-mile country jaunt.

The Triborough suspension bridge — a mammoth project in itself—is but a part of this vast enterprise. As early as 1916 its need was seen, but actual construction did not begin until 1929. By 1932 some of the viaduct foundations and the suspension anchorages were completed. Then work stopped.

For almost two years hardships in financing brought progress to a standstill. Foundations and anchorages lay forlorn and unused, waiting for funds to bring them to active life. Then at last, with the creation of a Triborough Bridge Authority and the aid of Public Works Administration, derricks, riveters and mixers again roared into action.

The original plans had called for a suspension bridge of four-cable, double-deck design —four roadways each carrying four lanes of traffic, or 16 lanes in all. Investigation revealed that it would be impossible to build adequate approaches for 16 lanes. This meant



New almost completed, the framework of the bridge sweeps majestically into Borough Manhattan. Steel work for the runways is already under construction in preparation for opening ceremonies July 1. Below—A scale model of the entire project as it will appear when completed. Streets in the Bronx and Queens are being widened for the approaches, while on Wards and Randalls Islands, the roadway will be elevated. Circle—Artist's drawing of the $2,000,000 traffic sorting device on Randalls Island. No traffic lanes conflict.

Wind and Traffic Wage Tug Of War With Cables

that traffic would be bottle-necked at the entrance.

A sweeping re-design was made, changing the bridge to a two-cable suspension having a single deck with two roadways of four lanes each. Skillful planning made it possible to use the previously-constructed tower foundations and anchorages, which had been built for a double-deck bridge. Economies were effected by substituting steel for concrete in the arches, and concrete for granite in the roadways.

Paralleling the famous Hell Gate railroad arch, the new suspension span will link Queens and Ward's Island with an eight-lane roadway hanging 135 feet above the swirling waters of Hell Gate. With an overall length of more than a half-mile, its main span will stretch 1,380 feet across the river, with two 705-foot side-spans binding it to its anchorages. Its two silicon-steel towers reach 270 feet into the sky from their concrete foundations, which are shackled solidly to bedrock.

These towers are destined to endure a perpetual enormous tug of war between the pull of the cables and the restraint of the land anchorages beyond. The two main cables, 20⅝ inches in diameter, are composed of 37 strands, each strand containing 248 wires spun and compacted to an almost solid unit. Those gracefully-curving ropes of steel will each be subjected to a maximum tension of 22 million pounds. These in turn pull upward on the suspender ropes, each of which carries up to 100,000 pounds of tension from the roadway swinging far below.

Into the towers went 5,500 tons of steel; but, titans that they are, they must bend. Built 11½ inches wide of vertical, they will

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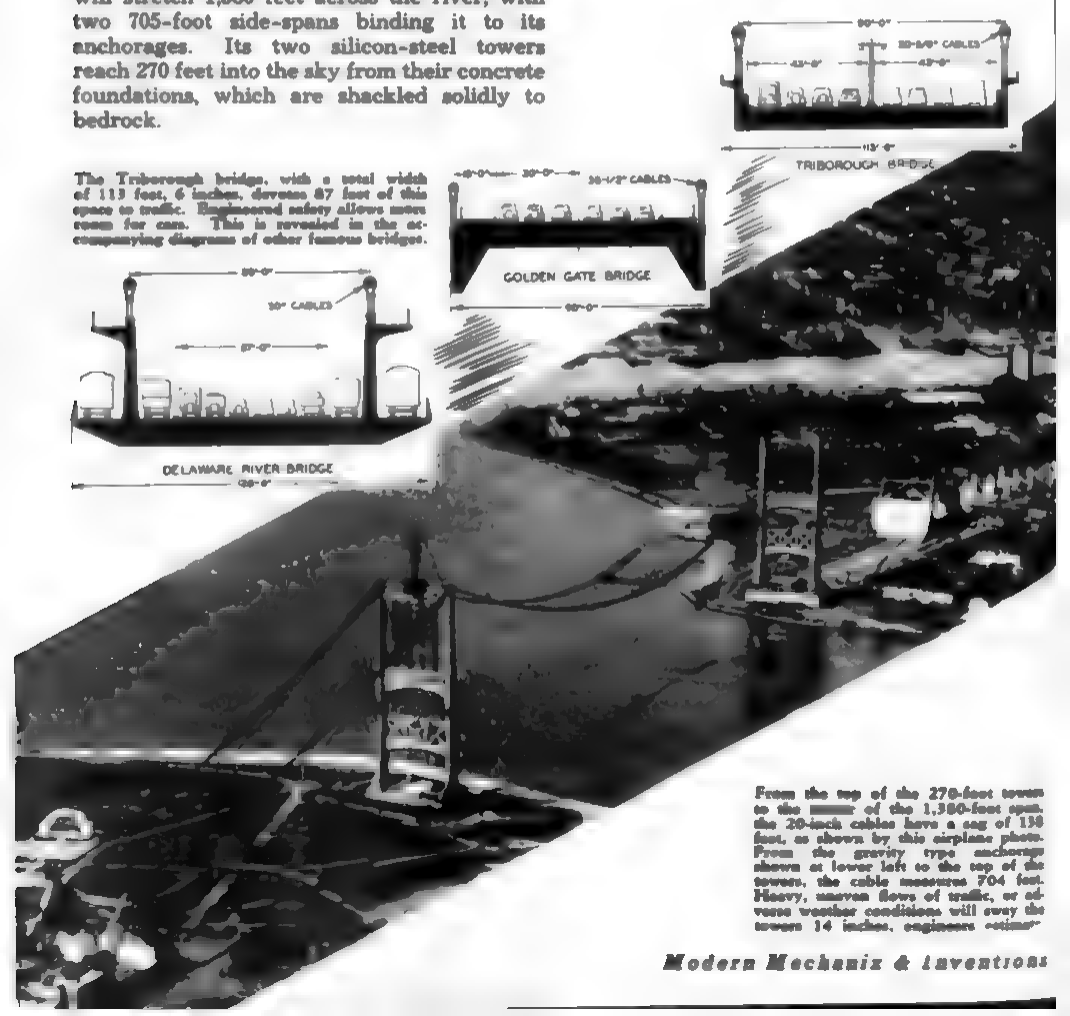
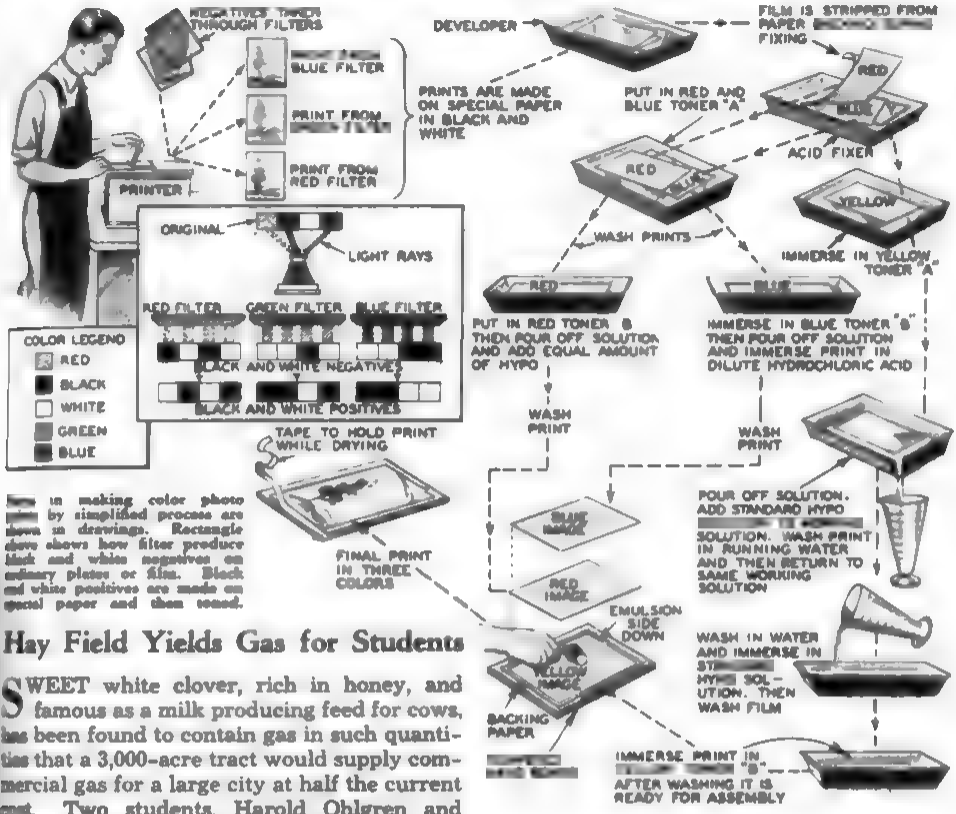


The Triborough bridge, with a total width of 113 feet, 6 inches, devotes 87 feet of this space to traffic. Engineered safety allows more room for cars. This is revealed in the accompanying diagrams of other famous bridges.

From the top of the 270-foot towers to the center of the 1,380-foot span, the 20-inch cables have a sag of 135 feet, as shown by this airplane photo. From the gravity type anchorage shown at lower left to the top of the towers, the cable measures 704 feet. Heavy, uneven flows of traffic, or adverse weather conditions will sway the towers 14 inches, engineers estimate.

Amateurs Can Print New Color Photos



Steps in making color photo prints by simplified process are shown in drawings. Rectangle above shows how filter produce black and white negatives on ordinary plates or film. Black and white positives are made on special paper and then toned.

Hay Field Yields Gas for Students

SWEET white clover, rich in honey, and famous as a milk producing feed for cows, has been found to contain gas in such quantities that a 3,000-acre tract would supply commercial gas for a large city at half the current cost. Two students, Harold Ohlgren and William Mahle of Macalester College, St. Paul, Minn., were the discoverers of the process, which is attracting nation wide attention

Dean R. U. Jones, head of the chemistry department of Macalester College, is taking lessons from Harold Ohlgren and William Mahle, two of his senior students. They are the discoverers of a cheap commercial gas in sweet white clover.

PRINTING of photographs on paper in natural colors is now within reach of the amateur photographer. The new process employs ordinary plates or films or the usual color plates can be used. Prints can be made either by the two or three color separation process.

In the three color process three negatives are made through blue, green, and red filters. The negatives are developed in the usual way. Black and white positives are then made on a special stripping film of a thickness of one-thousandth of an inch. The positives are then toned yellow, magenta, and blue-green. The three films are superimposed upon one another on white paper to produce the natural color print.

As many color prints as desired can be made from the same negatives. Natural color lantern slides can also be made in the same way. With average cameras still subjects are best. For action shots bipacks can be used.

Hen Changed to Rooster by Biologists

Scientists of the Biological Institute of the College of France inspecting the Hypophysis gland during their usual experiments on poultry in which they reversed sexes. At left a biologist poses with a crowing rooster that had been, until the gland operation, a normal hen.

TURNING roosters into hens and vice versa is the newest miracle to be attempted by science. Working at the Biological Institute of the College of France a group of scientists are engaged in a series of amazing experiments on the hypophysis gland, a small gland situated at the base of the brain.

It is their belief that by transplanting this gland from the body of a rooster into the body of a hen a complete change of sex will be effected.

In early experiments conducted on various breeds of poultry French Biologists have succeeded in proving their contention.

Canned Blood To Save Human Life

SAVING life by using "canned blood" for transfusions is the prophesy of Dr. David John Davis, dean of the University of Illinois Medical School. Dr. Davis states that in Russia the use of canned blood has been highly successful for more than five years and that there is no reason why it should not prove equally successful here.

The blood is taken from dead persons, tested for disease, classified, and then sealed in sterile containers ready for immediate or future use. Dr. Davis announced that in preliminary tests made on dogs results were more than pleasing.

Until now the saving of a life depended upon a person willing to give his blood, provided it was the correct type. Canned blood will make this unnecessary.

New Alloy Produces Super Magnet

A TINY magnet capable of lifting sixty times its own weight has been developed by engineers of the General Electric laboratories research department. Constructed of a new alloy to be known as "alinco," a compound of aluminum, nickel and cobalt, the magnet possesses more lifting power than any permanent type used heretofore.

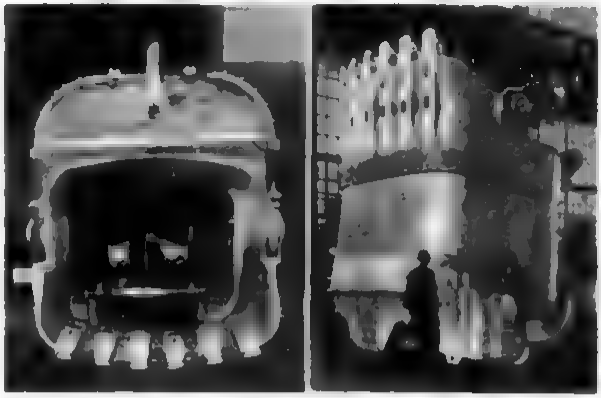
A tiny magnet is shown, at left, lifting a 50-pound radio [illegible] with comparative ease. Above is the magnet, itself, in the hands of W. E. Ruder, inventor of the new alloy.

Giant Power Shovel Loads 32 Wagons With A Single Scoop

A POWER dipper, the world's largest, was recently placed in operation near Wilmington, Ill., where it will be used in coal stripping service. So large is the shovel that nearly forty men can stand up inside it. It is capable of scooping up 32 wagon loads of dirt at one bite and filling a railroad gondola car in two loads.

The giant dipper replaces one of smaller size which the owners outgrew, and which was formerly the largest in use. In order that the new shovel could be used on the old crane it was essential that it weigh no more than the first. The manufacturers solved the problem by using a special alloy that was not only light in weight but just as strong as the metal used in the making of the first scoop.

While this is the first and only power shovel ever to attain such size, the makers are ready to make one even larger if necessary.



Mighty monarch of the machine industry, this huge scoop will be used in the Illinois coal fields. The huge shovel holds enough dirt to fill 32 wagons or a small railroad car, and can accommodate 40 men or house an automobile.

Paver Shaves Away Road Bumps

Worn asphalt streets and highways are given a smooth new top by this machine which actually shaves away all bumps and holes leaving a surface that is perfect for driving.

BUMPY asphalt streets and highways are restored to their original smoothness, and at a fraction of the usual cost, by a new paving machine that does the job in a single operation.

A large gas heated firebox in the center of the machine heats the asphalt to a pliable condition. Sharp blades located at the rear cut an even layer of asphalt from the street leaving a smooth new surface. The top asphalt is salvaged and used in the paving of new streets.

"Electric Ear" Guards Prisoners

AN "ELECTRIC EAR," perfected by an inmate, permits guards at the Columbia Reformatory, near Washington, D. C., to listen in on prisoners' conversations during dinner and assembly hours.

Operating on the "reverse current" principle the "ears" can be switched over for use as loudspeakers like the usual intercommunication system. It is believed that this mechanical "stool pigeon" will prevent propaganda from circulating.

One of the "electric ears" used to eavesdrop on the inmates of an eastern institution. Officials can now check propaganda before it has a chance to circulate among the prisoners.

DEATH STALKS

Today men as courageous as history's daring explorers cross last frontiers into the dark, forbidden unknown. Is Redfern, missing aerial pioneer, a god among savages? A Scott disaster does not stop South Pole explorers; a bursting balloon will not end the search for stratosphere secrets. Read about today's Magellans.

Ellsworth expedition photos copyright by N. A. N. A.

Lincoln Ellsworth (top left) in the prow of his ship *Wyatt Earp* surveys the frozen reaches of the Antarctic. A year ago he attempted to fly across Antarctica from Snowhill Island (above). In foreground is hut where Otto Nordenskjold, Swedish explorer, almost died in 1903 when supply ship sank in an attempt to reach him. Top right—The *Polar Queen*, the plane in which Ellsworth started across Pole.

COLUMBUS, Sir Francis Drake, the Cabots, Magellan—for centuries history has rung with the daring of these men. They and their kind went down to the sea in ships—ships pitiably crude to our notion—and many never returned.

In a later world whose circumference had been largely explored, Scott, Shackleton, Amundsen, Peary and Nobile courted disaster to penetrate the mystery of the North and South. Ships were their only refuge—vessels that slowly wound their way through treacherous ice-floes, and were often imprisoned in ice for months.

Today, in 1936, the spirit of adventure and discovery is still very much alive. It was a mere matter of hours for Lindbergh to span the Atlantic; and such men as Chamberlin, Post, and Byrd have immeasurably advanced navigation and exploration with the aid of modern equipment and technique. What formerly took months and years is now accomplished in a small fraction of that time.

But death still haunts the modern explorer. Death awaits hungrily for his least error in judgment, for the first failure of his craft. And death is still often the victor in this combat of man against fate. Within the last few months the dangers and the uncertainty of modern, well-planned, scientific expeditions to uncharted borders of the world has been starkly revealed.

In 1927 a 25-year-old airman named Paul Redfern took off from Brunswick, Georgia, and headed for Rio de Janeiro. He was sighted 300 miles off the Bahamas—and that was the last ever seen of him. All hope for him was given up.

Years later strange tales began to emanate from the jungles of Guiana. Wanderers into the tropic fastnesses returned with stories of a white man cared for by friendly Trio Indians. These natives, it was said, treated their guest much like a god, for he had descended upon them from the air.

These were dismissed as wild imaginings until a Catholic missionary returned from the Guiana border with facts more stirring than fiction. The missionary had talked with a stray Trio Indian, who vouched for the truth of these tales. A "white god" resembling

The MODERN EXPLORER

Top photo shows Paul Redfern tuning up at Brunswick, Ga., before disastrous flight to South America in 1927. Above—Redfern at the nose of his ship. Eight years later he was reported seen in Dutch Guiana wilds crippled, but a god among savages.

Redfern had really crashed into the jungle eight years before. Suffering from a broken hip that deprived him of the use of his legs, the "sky god" was carried to the village of friendly natives and there treated with the deepest respect.

Redfern, it appeared, had survived his harrowing experience. But, strangely, he did not want to return to civilization. Fearing that in his crippled condition he would be a burden to his father, he wished to spend the rest of his days in the solitude of the jungle.

Nevertheless, the missionary sent word to Redfern by way of the Indian that a rescue

Upper balloon photo copyright by National Geographic Society

After failures that almost resulted in death, Capt. A. W. Stevens (left) and Capt. Orvil Anderson, pictured above in the gondola of their balloon, succeeded in establishing a new stratosphere record. They reached a height of 72,395 feet, almost 14 miles. Above—Balloon, equivalent in height to 31-story building, soaring over White Lake, South Dakota.

NOTED Pacific Aerial PIONEER DISAPPEARS in Sea

In plane above, the *Lady Southern Cross*, Sir Charles Kingsford-Smith, noted flier, disappeared over shark-ridden Bay of Bengal on flight from Allahabad, India. Kingsford-Smith was the only flier to successfully span the Pacific from California to Australia. He made the return flight last year.

party would be started out for him about the end of December. William LaVarre, a mining engineer and explorer, plans an air expedition that may soar over the huts of savage enemy tribes and reach Redfern. From Paramaribo, Dutch Guiana, Art Williams, former U. S. army pilot, conducted an aerial search for Redfern into the jungles with Co-Pilot Harry Wendt and Edward Sill, backer of the expedition. The airplane, which plunged Redfern into an 8-year exile in the jungles, may be the means of rescuing him.

Sir Charles Kingsford-Smith won fame in 1928 by first spanning the Pacific, 7,800 miles of perfect navigation across tiny ocean isles. He has faced danger and death many times. On a flight from Sydney to England he and Charles T P. Ulm, who disappeared recently on an attempt to repeat the Pacific crossing, were forced down in the Australian bush. For twelve days they lived on beans and snails until found by rescue planes.

On a speed flight from England to Australia, Sir Charles, with his co-pilot Tom Pethybridge, set off on November 7 from Allahabad, India. His destination was Singapore, far over the shark-ridden Bay of Bengal. Hours later he was seen by another airman, C. James Melrose. Melrose reported that Kingsford-Smith had been flying only 200 feet above water, about 150 miles from shore. Battling a raging monsoon, flames were spouting from the exhaust pipe of his monoplane. The intrepid fliers have not been seen since.

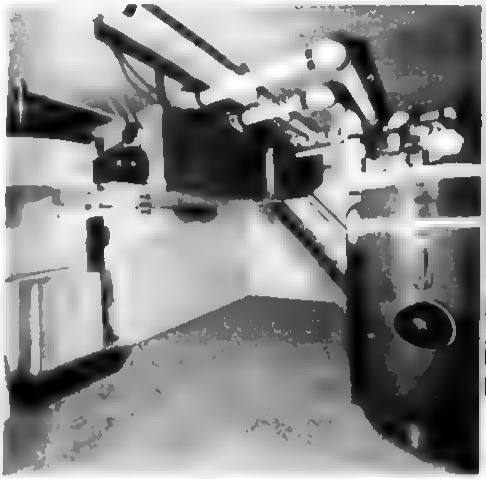
Burmese and Malay natives have beaten the brush, Chinese junks have searched hidden inlets, and 37 bombers of the Royal Air Force have scanned the sea and the jungles to no avail. Has the smiling Sir Charles joined the daring explorers of by-gone ages or will he apear again ready to blaze a new trail through uncharted seas?

Far down at the very end of the earth, a splendidly-equipped exploration party is attempting one of the most audacious feats ever essayed by man. Lincoln Ellsworth, the American famed for previous polar ventures, has again attempted to span a frozen, uninhabitable waste—to fly across the Antarctic Continent and the South Pole.

Ellsworth's supply ship, the *Wyatt Earp*, has been stationed at Dundee Island, 600 miles south of Cape Horn. To fly from there across the barren Anarctic Continent in-

[*Continued on page* 144]

Low Cost All-Electric Home Features Air Conditioning



Above is a view of the home's basement showing the oil heating system to the left with the air conditioner opposite it. Arranged in the most convenient and compact style the ultra modern kitchen, at right, also serves as the home laundry. At the upper right is shown the modern home as it appears from the outside. Simple landscaping helps add to its charm.

ULTRA-MODERN in style, a new model home has been built at Wantagh, Long Island, featuring electrically operated conveniences throughout. Constructed so that every possible space is well used, it is said to be the first of its type in the New York metropolitan area within a range of $5,000 to $10,000.

The temperature inside the house remains uniform the year round no matter what the weather may be. Controlled by thermostats, the electric oil burner and air conditioning systems go into operation as soon as the normal house temperature shows a change.

The unusual design of the home increases the usable space 15% over that of the average although the house is not as large. This feature permits the use of a smaller building lot resulting in a lower tax rate. Walls but 4 inches thick, insulated with rock wool, account for much of the room space in the house.

Rubber Made At 100 Below Zero

TEMPERATURES as low as 100-degrees below zero are used in the making of synthetic rubber. Employing a system of tanks, condensers and stills cooled by a huge centrifugal refrigeration machine the ultra low temperature is used as one factor in separating from acteylene the substance which is the base of artificial rubber.

Foot Warmer Goes Modern

IDEAL for the winter months this electrically operated unit keeps the feet cozy at all times. Fashioned along modern lines and looking very much like a bath scale the heater is a variation of the customary warming plates of days gone by.

This electrically heated foot warmer is an improvement over those of our grandmother's day.

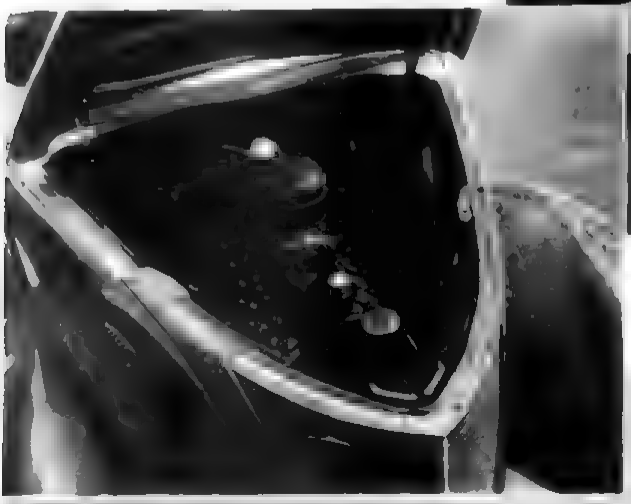
Tiny Gadgets Make GREAT

RANGING from devices which prevent a car from rolling backward on a hill, to midget brake-testers, automatic driving controls, and novel departures from conventional design, the automobile of 1936 presents convincing evidence of the constant efforts of inventors and engineers to build safety and comfort into the modern motor car. No problem of the motorist is too trivial to be ignored by the man who, either in the drafting rooms of big manufacturers or in some backyard workshop, are constantly applying their mechanical genius to all aspects of this greatest of American industries.

What automobile driver, for instance, has not experienced the annoying hazard of being compelled to start his car from a dead stop on the upgrade of a steep hill? The moment the driver's foot is transferred from brake to accelerator, the car starts to slide backward to the frequent accompaniment of clashing gears, stalled engine, and perhaps a smash into the bumpers of the car behind.

This danger is automatically eliminated by a device on the new Studebaker aptly called the "hill-holder." It does away with the need for a third foot which the harried driver is likely to consider a desirable appendage when clutch, brake and accelerator demand simultaneous pedal control. With the hill-holder, when the car is stopped facing uphill, the driver disengages the clutch and steps on the brake. As long as the clutch remains disengaged the brakes are kept on automatically by a simple vacuum linkage between clutch and brake pedal. To start again, the right foot is placed on the accelerator, the brakes are released when the clutch pedal is depressed, and the car moves forward under complete control.

In a field as highly competitive and as receptive to new ideas as the automotive industry, it is not surprising to find the 1936 models proving automotive engineers to be men of daring imagination willing to strike out along unconventional lines. In the Lincoln Zephyr, a new Ford streamlined car, we have an automobile totally without a chassis as it is usually defined. The steel body is itself the chassis, being separately fabricated as a unit and attached to a stub chassis on

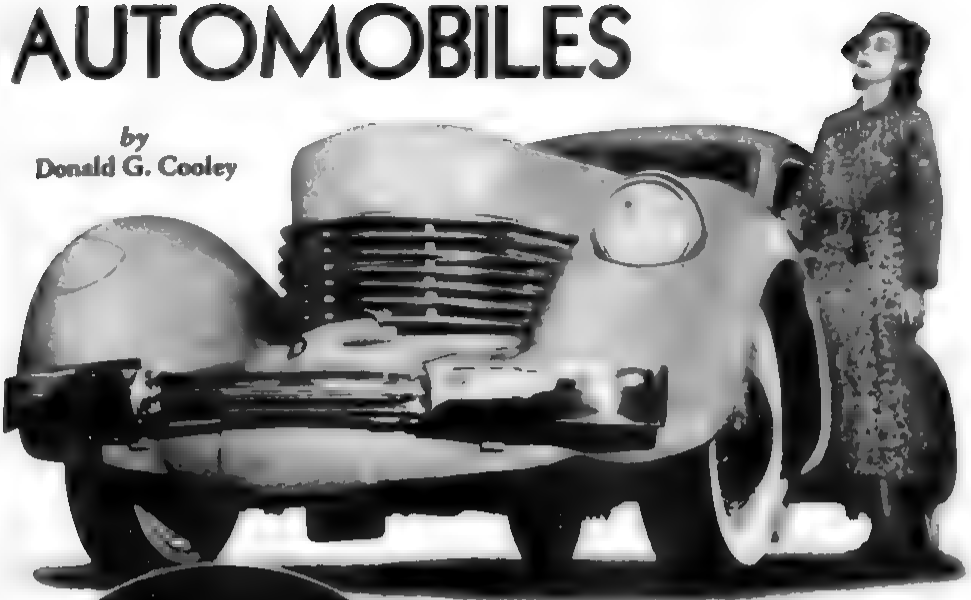


Greater comfort for front seat riders is provided by the relocation of the hand-brake in this Oldsmobile. The brake is now at the left of the driver, under the panel, instead of in the door center.

The motor head on the new Lincoln-Zephyr does vertically on overhead-opening hinges, providing easy access to the oil and radiator filler caps. The powerful V-12 motor represents a marvel in compact engineering.

AUTOMOBILES

by
Donald G. Cooley



At night the headlights on this modernistically designed Cord car rise from fenders at a touch of the dash controls. During the day they are closed for streamlining as on right fender. Below—Like a Pullman berth, this LaFayette becomes a bed for three in a few moments. The rear seat back folds into the trunk for leg room, and the other cushions make up the bed.

front and rear wheels. This radical departure is said to increase safety and comfort, since the passengers are virtually slung between the two axles.

Motor car design seems to be rapidly approaching the complete elimination of the gear shift lever in favor of various simpler mechanical methods of gear shifting. Reo, Hudson and Terraplane, and Cord offer interesting examples of this trend, which not only simplify the mechanics of driving, but increases the space available to front seat

These devices provide a gear selector on the steering wheel column, usually in the form of a cylinder with a small finger shift lever which can be flipped to reverse, low, or any desired gear ratio. The finger shift operates a magnetic valve, and when the clutch is thrown out shifting is effected by power applied through a vacuum cylinder and vacuum diaphragm.

Cord, which is the only production car with a front wheel drive in this country, offers another radical design in disappearing headlights. The lamps are mounted in the fenders and when not in use are swiveled inward toward the wheels, presenting a surface flush with the fenders. Control is effected through individual cranks on each side of the instrument panel, which are manually oper-

Today's car is not just a vehicle for transportation. With its luxurious appointments, innumerable conveniences, boundless power and absolute road control, it becomes a traveling home with the whole world for a front yard.

Safety Rides With Comfort In Today's Motor Car

A simple twist of the front seat in the new LaFayette coupe reveals the spare tire, cleverly tucked out of the way of weather or thieves.

exposing the trunk which affords leg-room for the bed. The front seat cushion is placed directly behind the front seat, the rear cushion left in place, and the back of the rear seat placed in the trunk compartment. The three cushions are leveled off by six small supports and a bed large enough for two people is provided.

Much of the danger in night driving is removed by improved lighting methods adopted by many cars. When passing an approaching car, the driver steps on a button which controls the passing beam. The beam is deflected to eliminate glare and the left headlight concentrates its rays on the right side of the road where it is most needed. Dashboard instruments warn the driver when his lights are set for passing. In the Buick, this is done by a red light on the panel, and in the

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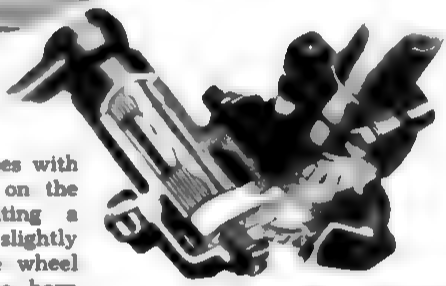
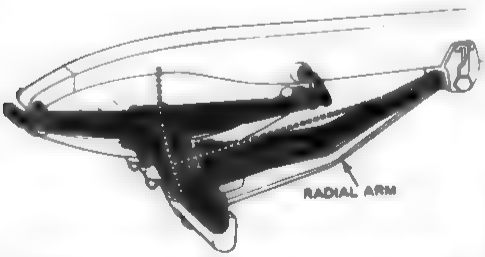


ated. The Cord dispenses with the usual horn button on the steering post, substituting a slender metal ring of slightly smaller radius than the wheel itself, which sounds the horn when touched on any position of its circumference. The driver can thus blow the horn without removing his hands from the steering wheel.

Vacationists will appreciate the simple mechanical design which enables the Nash or Lafayette sedan to be converted into a roomy, full-size bed. Two hinge pins make it possible to remove the back of the rear seat.



Radial safety control marks Hudson's contribution towards greater riding comfort and safety. Heavy radial arms check all twisting strains on the front axle, leaving the springs free to absorb road shocks. The action of spring and radial arm on rough roads is shown in the above phantom drawing. Right—A long arm hinge which slides out of the way beneath the instrument panel, when the door is closed, enables Packard to have a wide opening door, and at the same time reduce thickness of windshield pillar, making for greater visibility.

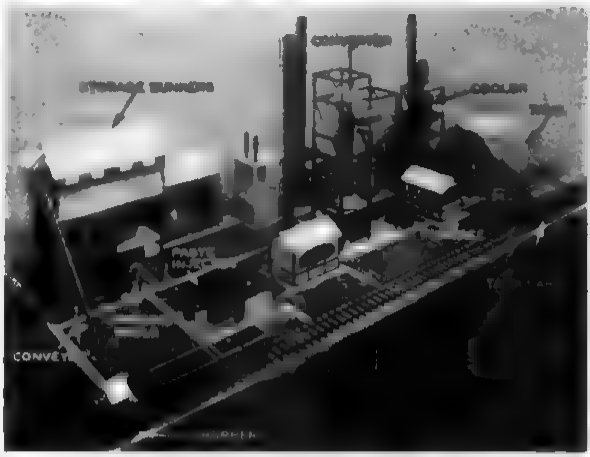
Anti-friction bearings in the Ford V-8 steering gear are credited with contributing towards reducing steering effort in the new car by 25 per cent. The needle bearings shown in this cutaway photo are now this year

Gasoline Made from Soft Coal at New British Plant

A PLANT to convert coal and oil into liquid fuel, having characteristics similar to those of gasoline, has just been placed into operation at Billingham-on-Tees, England. From this one plant Great Britain will be able to produce 4% of her gasoline supply. With by-products of "gas" and Diesel oil the venture is expected to prove a profitable one.

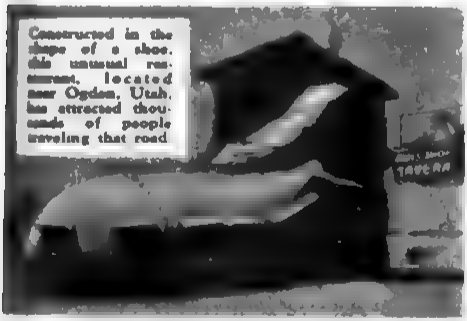
The fuel conversion is made possible by the hydrogenation process in which coal is treated under pressure at high temperatures with hydrogen—transforming nearly all of it into gasoline or gaseous hydro-carbons.

At the present time there are three plants in the world equipped to convert coal into liquid fuel oil. One is located in the United States, another, even larger than England's, in Germany. At the present time there are several other plants of this nature under construction in various parts of Germany, with England also planning for building more. With the world's petroleum supply growing smaller and smaller this new fuel source is invaluable.



Conveyer lifts coal to bunker. Passing to mills it mixes with heavy oil. Resulting paste is forced by injectors to converters where it mixes with hydrogen. Heated to 450°C., the oils and gases separate. Oil is collected in fractionating columns, distilled, condensed, briefly refined and is then stored in large fuel tanks ready for immediate or future shipment in tank cars.

"Woman in Shoe" Has Restaurant



Constructed in the shape of a shoe, this unusual restaurant, located near Ogden, Utah, has attracted thousands of people traveling that road

"THERE was a young lady who lived in a shoe;
Its use as a restaurant made her well-to-do."

Fashioned after the famous Mother Goose rhyme, a giant boot has been converted into a restaurant by Mrs. Anne Fleming of Ogden, Utah. Its unusual shape attracts many visitors, few of whom can resist stopping for a lunch or dinner.

Airport Features Cotton Runway

CONSTRUCTED of more than 15,000 square yards of cotton material, a revolutionary type of airport runway is to be built at Newark, N. J. Designed by engineers of the Textile Institute the cotton and asphalt laminated runway will measure 200 feet wide and more than 700 feet in length.

$50,000 Mystery Boat Seeks Record

RADICALLY new in design and featuring a 650 h.p. motor the "Miss America III" is the latest entry in the Harmsworth Speedboat Trophy competition.

Its builders hope that with the special hull and secret features employed they will be able to better the record now held by Gar Wood.

Latest of entries in the Harmsworth Speedboat Trophy race is "Miss America III." She is shown here during trial runs which were made on the choppy waters of Detroit River.

Russian Troops Parachute From Sky In Attack On "Foe"

Unusual photo of Russian troops floating to earth in parachutes during war games. After landing, troops reform into regulation units and make a surprise attack upon "foe."

DURING recent army games conducted near Moscow more than one thousand soldiers were released from airplanes, parachuting to earth, behind "enemy" lines. After floating to earth the soldiers reformed into units and made a surprise attack upon the foe from the rear.

The Soviet Government, through their army and air corps has been combining to show the efficient manner in which troops may be landed by means of parachutes.

Army officials of other world powers have been looking on with great interest at the latest of Russia's plans for protection of its interests should war occur in Europe or Asia in the near future.

Helium Gas Prevents Choking

ORDINARY balloon gas has been found to save the lives of persons choking to death. Since helium is only one-third the weight of ordinary air it readily passes through the choked breathing passages, with only one-third of the required muscular effort.

Members of the American Medical Association voiced their approval of the outcome of the demonstrations where the gas was used.

Students Test Body Energy

On intricate instruments these students at Wellesley College are making "body energy" tests to determine if girls who come from warm climates use less energy units than [illegible].

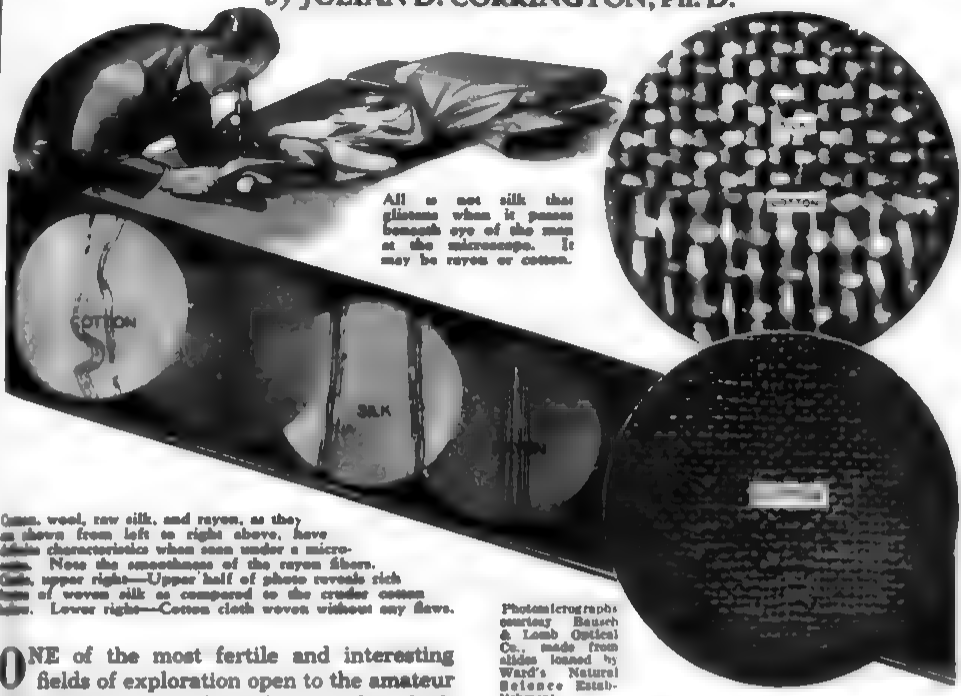
SUBJECTING themselves as "human guinea pigs" students at Wellesley College are making tests to find the energy quotients of girls from different parts of the country.

The tests are made on an intricate series of instruments which record the various findings on a moving chart operated by a special motor. In this way comparisons of the individual tests can be readily made.

Findings prove that persons living in a warm climate require only a fraction of the body energy needed by those coming from a cold region. The experiments were supervised by the college faculty.

Fashion Parades Beneath The Microscope

by **JULIAN D. CORRINGTON, Ph. D.**



All is not silk that glistens when it passes beneath eye of the man at the microscope. It may be rayon or cotton.

Cotton, wool, raw silk, and rayon, as they are shown from left to right above, have definite characteristics when seen under a microscope. Note the smoothness of the rayon fibers. Cloth, upper right—Upper half of photo reveals rich lustre of woven silk as compared to the cruder cotton below. Lower right—Cotton cloth woven without any flaws.

Photomicrographs courtesy Bausch & Lomb Optical Co., made from slides loaned by Ward's Natural Science Establishment

ONE of the most fertile and interesting fields of exploration open to the amateur microscopist is that of textiles, a realm which also provides one of the largest professional outlets for those who wish to make their living through their knowledge of this instrument, the compound microscope.

Every weaver of goods and spinner of threads employs microscope experts to keep informed as to the quality of fibers, identification of the hundreds of types of fibers involved, perfection of the woven or knitted fabric pattern, quality and penetration of dyes, and scores of other processes and ingredients in this complex trade. Excellent opportunities await those skilled in manipulation of the magic eye.

Permanent slide mounts are easy to make. Begin with a piece of cotton goods, cutting a square about one-half inch on a side, and then with needles, ravel one edge to expose the separate threads so that individual fibers may be seen. Thus, a single mount will show the pattern of weave, the twist of threads and the details of fibers. Place the square in full strength alcohol for ten minutes, xylene for a similar period, then mount in balsam. Separate slides of threads, yarns and fibers are all made this same way.

There are dozens of problems involved in studying such slides, but two in particular will appeal to most microscope users; fiber identification and weave analysis.

The world of fibers! There are so many kinds and from three general sources, animal, vegetable and mineral! Wool and silk take the lead among animal contributions to the textile demands of mankind, cotton is far and away the most important vegetable entry, and asbestos is supreme among minerals. Linen, hemp, ramie, sisal, esparto; some of these names have long been familiar, others are just now coming into prominence, are also prominent vegetable entries.

Animal fibers are hairs (wool, mohair, camel hair) or liquid secretions which harden instantly upon exposure to air (silk, tussah silk). Vegetable structures used in textiles constitute the supporting elements of plant stems (linen) or of aerial seeds (cotton). Minerals occasionally crystallize into long needle-like fibers, chiefly used for their fire-resistant properties.

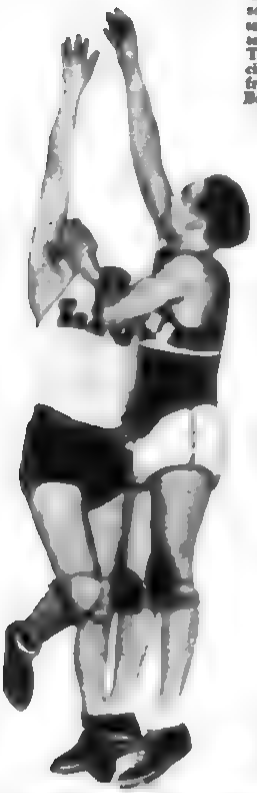
Spotting the different kinds is a matter of experience and practice, and the necessary knowledge must be acquired by degrees. Each

[*Continued on page* 130]

PLAYS that WIN in

by
TED O'SULLIVAN

Captain, Missouri University Team, '27; Member, All Mo.-Valley Team, '25 & '27; Former Coach, De LaSalle Academy.



Good centers use the corkscrew jump with fingers extended and held close together to get more height in jump. To avoid tangle center leaves circle in opposite direction from which ball has come. Below—Two team formations for center tip-off plays.

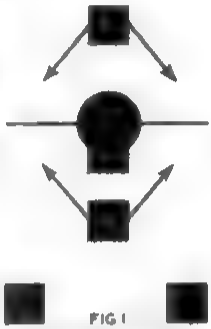


FIG. 1
FORMATION WHEN LOSING TIP-OFF

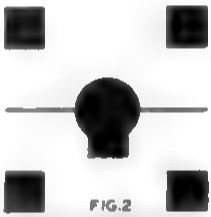
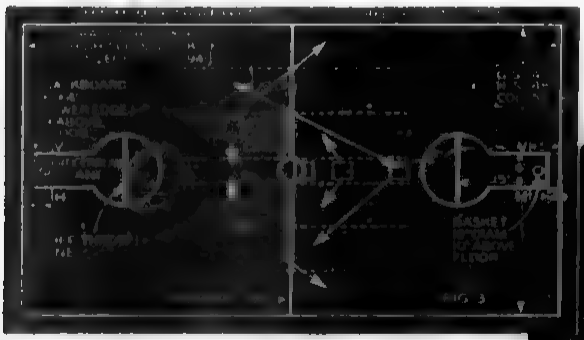


FIG. 2
TIP-OFF FORMATION WHEN CENTER CONTROLS TIP-OFF

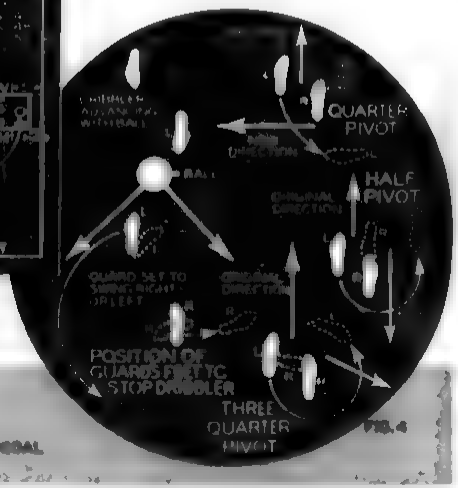
WHEN, forty-three years ago, Dr. James Naismith tacked a couple of peach baskets to the walls of a gymnasium and introduced gym classes at the International Y. M. C. A. Training School in Springfield, Mass., to a game which he called "Basket Ball," he had no way of knowing that he had invented what was to become the national indoor winter sport.

The game gained immediate popularity, though, and soon was taken up by high schools and colleges all over the country. The rules were standardized and it was not long until a style of play was evolved which was accepted as more or less standard until a few years ago. Within the last ten years, however, as competition between teams has grown keener, the game has gone through a series of changes which have made it more interesting for both player and spectator.

The old "Start and Stop" style of play that featured desperate long shots and frantic races up and down the court is now a thing of the past. The championship teams of today are versatile and well trained in all phases of a game which is becoming faster and more scientific each year



Dimensions for basketball court in grade school, high school or college are shown in Fig. 3. Team formation shown is used when center is able to control tip-off. Fig. 4—Guard must be in position to swing to either side. Pivots are also shown



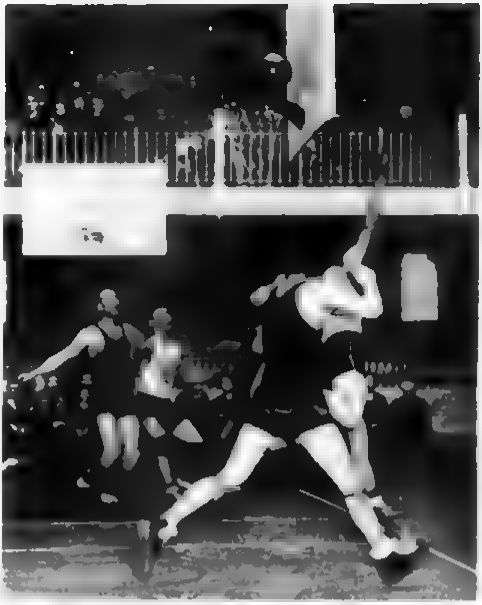
Basketball

Although a few teams still employ the zone type of defense, the majority have changed to the man-to-man style in which every player is assigned an opponent who must be guarded. The success of scoring plays depends upon deception, screening, and fast floor play.

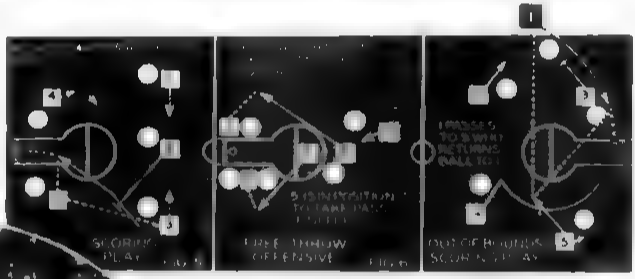
Due to the new rule which does not permit an offensive player to remain in his own free throw lane for a period longer than three seconds, it is not known yet what changes this will make in the offensive style used by the majority of teams. Many coaches are planning to try out plays built around a double post, stationing a man just to the right and another to the left of the free throw lane as in Fig. 5.

The ball is brought into the front court and passed back and forth until players No. 4 and No. 5 are set. These are the two pivot men. No. 3 receives the ball, fakes a pass back to No. 2, but instead passes to No. 5. At the same time that he cuts in toward the goal, No. 4 fakes to the outside to draw his guard away from the basket. No. 3 receives the ball and if clear tries for a goal. However, if No. 4 player's guard

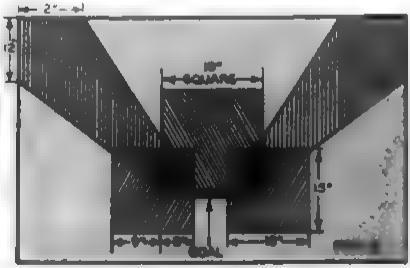
[*Continued on page* 124]



A West Point player rushes in to score against Syracuse U. Long shots and dribbling races up and down the court do not feature today's games. Deception, fast floor play are the rule.



Three effective scoring plays are shown above. The use of the double post, pivot men on either side of free throw lane, has been developed due to new rule that offensive player cannot remain in his own free throw lane for more than three seconds.



Circle—Player breaks away from guard to take shot at basket. Other white-shirted players are in position to rush in and take ball on rebound, if try fails. Accuracy in goal shooting can be developed by scoring board as shown in Fig. 8.

New Radio Motor-Lifeboats Required On Coastal Liners

A radio equipped motor lifeboat undergoing the drastic inspection of United States Steamboat Inspectors. Boats similar to this will be required on all intercoastal ships.

AS FURTHER protection against sea disasters the United States Government has ruled that all steamboats be equipped with special lifeboats. These craft will not only be motor operated, but will carry complete radio and searchlight apparatus so that all lifeboats can keep in direct contact with each other should a disaster occur.

The first of these crafts to be put into service was given extensive tests in the New York harbor before United States Steamboat Inspectors. The results of the tests proved highly satisfactory. Every attempt was made to locate faults in the two-way radio equipment and searchlight signaling system, but to no avail.

In the future all vessels engaged in intercoastal traffic will be required to use this latest safety device.

Lamp Has Variable Light Control

A NEWLY patented sick room light can be dimmed by a simple twist of the wrist. Constructed of metal throughout and fitted with a parchment shade, the lamp fits into the decorative scheme of any room. An ingenious rheostatic control located in the base of the lamp is used to adjust the brilliancy of the electric light bulb. The lamp standard is connected to the control, and a twist either way takes care of adjustments.

This newest of sickroom lamps can be dimmed or brightened by a simple twist of the wrist.

Facsimile Telegrams Replace Code

Here is the first facsimile telegram sent from Buffalo, N. Y., being reproduced in the New York City office. The clattering key used first by Morse in 1844 is fast becoming obsolete.

PROVEN a definite success on the New York to Philadelphia line, facsimile telegraphy has taken the first step towards national expansion with the opening of a second line between Buffalo, N. Y., and New York City.

With the introduction of facsimile telegraphy, possibility of erros in the transmitted communication are reduced to zero. The telegram is no longer typed off a letter at a time to be reproduced on paper strips in the receiving office. Instead, the entire telegram, as written by the sender, is slipped into the sending machine where it is dispatched.

Curiosity Shop of Science

Frank Burgie, the Mammoth Man, has restored more skeletons of the great pre-historic beast than any other man. He is shown here completing a mammoth skull for the Curiosity Shop.

Science demands skulls for its studies of racial development, and the Curiosity Shop acts as a clearing house for all requests. Here is a table of gorilla skulls, while in the background can be seen all manner of weird specimens.

STONES ancient dinosaurs swallowed, to help digest their food;

Smear of camel's blood;

Bits of rock, from Baffin-Land;

Skeleton of Maori girl, with rickets; and of a dozen sperm whales.

Weird charms from a witches' cauldron? Not at all. Just some orders received and filled recently by Ward's scientific establishment in Rochester, New York, an institution unique in the whole world.

This curiosity shop of science holds not only the largest collection of minerals, fossils and meteorites in existence; it gathers more freaks of nature and of science than can be found anywhere. Its amazing contents are worth hundreds of thousands of dollars, yet Ward's is neither a "business" nor a museum. Under the auspices of the University of Rochester which helps meet its expenses, it is a treasure-house and clearing-house for scientists, schools and collectors. Started by the late Professor Henry A. Ward, eccentric geologist who in search of specimens adventurously circled the globe seventy-two times only to be killed by a Buffalo taxicab, its collections now fill a roomy five-story building on the Rochester campus. Notes taken at random include:

SHOOTING STARS: Professor Ward's special hobby. Whenever a meteorite fell, he would take the next ship to—Russia, Arabia or Persia, where he once begged one from the Shah himself. Bringing it back, the ship caught fire. Lest the captain desert it, Professor Ward sat on the meteorite, clutching a pistol.

THE MAMMOTH MAN has retired, having restored more skulls and skeletons than anyone living, of the great super-elephants that roamed early America. Frank Burgie, 75-year-old skilled taxidermist at Ward's, knows so well these monsters he never saw alive that he has developed special preparations of glue and shellac to preserve their prehistoric bones, and can reproduce all missing parts. He worked as an artist, in his own studio, detesting interruptions. His last task was to

[*Continued on page 120*]

Youthful Ingenuity Tackles Junk Pile; Result—A Transit

This home-made transit constructed from junk parts won for William R. Ahern the first prize in the "Yankee Ingenuity" contest annually sponsored by Worcester Tech.

JUNKED parts of radios, washing machines and vacuum cleaners, cleverly assembled into surveyor's transit, won for William R. Ahern, 18-year-old freshman of Worcester Polytechnic Institute, the $500 Yankee Ingenuity prize offered to encourage inventiveness among its students.

Knurled battery terminals and old battery receiver dials serve as micrometer adjustment controls while a radio grid leak, containing the usual spirits, serves as the level.

Young Ahern incorporated in his instrument numerous distinctive features, some of which are found only in the most expensive surveying equipment. In the opinion of the judges the transit was one of the most ingenious entries ever to be received in the traditional "Yankee" contest.

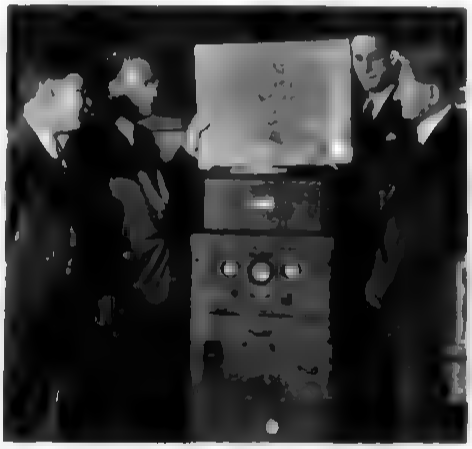
Auto Steering Post Is Adjustable

A TELESCOPIC steering wheel post that can be adjusted to suit the comforts of the driver is being greeted with enthusiasm by European motorists. Operated like a collapsible drinking cup the steering post may be set to any desired height.

Longitudinal splines keyed into corresponding grooves in the bore permit wheel to be moved up and down with ease. Several foreign autos are already equipped with it.

Operated like the popular picnic drinking cup this automobile steering post can be raised or lowered to meet the driving comforts of any occupant, whether tall or short.

Radio Operates Robot Weatherman



Designed to eliminate some of the dangers encountered by ships at sea this radio robot weathermen makes weather maps from radio signals sent out from government stations.

RADIO signals flashed from government weather stations to ships at sea will be recorded on charts by robot weathermen in one of the latest steps taken by science towards the elimination of "blind sailing." Facsimile weather maps revealing storm centers and low pressure areas will be at the immediate disposal of ship captains hundreds of miles from shore.

Picking up its signals in the same manner as an ordinary radio receiver the unit reproduces them in visual form instead of sound. With all vessels equipped with these receivers many disasters will be avoided.

Feminine "Ham" Heard 'Round The World

RADIO amateurs of six continents were contacted within 6 hours and 20 minutes recently by Miss Nellie Corry, young British radio enthusiast. The feat, regarded as a record in amateur broadcasting circles, is all the more remarkable in that Miss Corry accomplished it on a home made set costing less than $20.

Miss Corry built her transmitter in her home at Walton-On-The-Hill, Surrey, England, during her spare time. Working on a 18-meter wavelength on the occasion of her record breaking broadcast, she contacted amateur stations in Europe, Asia, Africa, Australia, and the two Americas.

Radio history was made by this young lady when she contacted radio amateurs on 6 continents in 6 hours, 20 minutes. She made her record breaking transmitter during spare time.

Sowbug Frog Food Costs Nothing

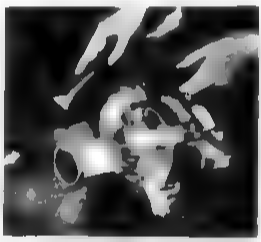
THE same living sowbugs which are a scourge in the garden or flower bed can be made to supply an inexhaustible source of food for the propagation of baby bullfrogs at the cost of but a few old newspapers.

The choicest food of the sowbug is the cellulose in an old, damp newspaper. Tack a few old papers on convenient sized boards and scatter them paper side down around the frog pond.

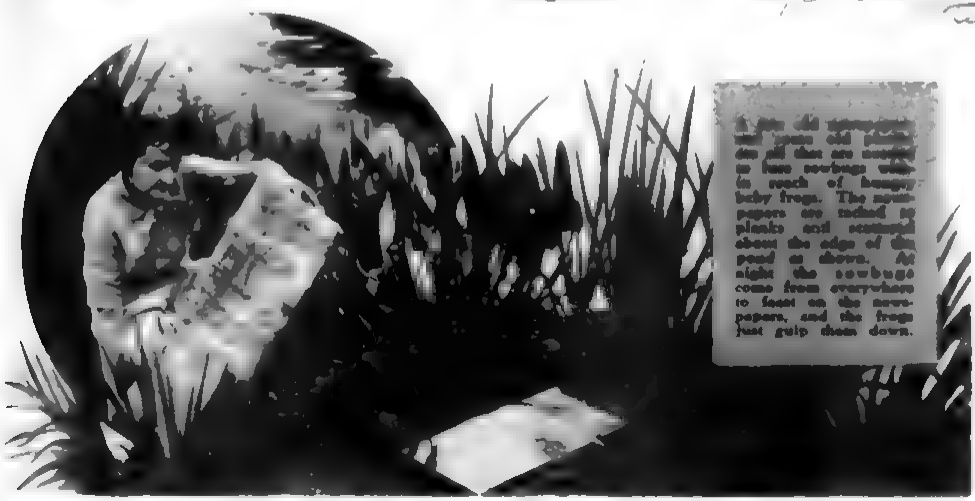
After nightfall the sowbugs begin to assemble for the feast, and the nocturnal feeding frogs are quick to discover the activity on the shore. They too gather about the paper boards, gobbling up each member of the sowbug army as he approaches. This heavy feeding continues until dawn.

Vacuum Unit Wars on the Moths

A CRYSTAL vaporizer for applying moth proofing treatment to curtains, rugs, draperies, and closets operates in connection with a vacuum cleaner. The crystals are fed into the power unit where they are reduced to a powdered form. An aluminum cap regulates the flow of the powder over the part being treated.



This unit, attached to a vacuum cleaner, operates as a moth proofing crystal vaporizer for fabrics.



OIL—*Modern* WAR GOD

This Italian machine gun outpost in the hills of northern Ethiopia would be threatened with extinction if trucks, running on gasoline, were unable to bring supplies.

Black gold, precious underground liquid, is food for the modern war machine. Deprived of it, a nation's military campaign is threatened with failure. Will oil become an instrument to enforce peace or to cause war?

WITHIN the last few decades, oil has changed from an almost unknown and unnecessary commodity to one of the world's most vitally needed materials. Oil, unlike nitroglycerin, has always been an innocent, viscous fluid used for lubrication and fuel. But harmless petroleum, like Dr. Jekyll, has undergone a startling transformation. Oil may yet be the means whereby the flaming torch of war is carried across the world.

Behind this strange tale of oil lies history's most spectacular conflict and the interlacing network of European diplomacy. The Ethiopian campaign of Italy, the advancement of science, agreements among world powers—these factors seem in a fair way to change petroleum from a respectable citizen of the economic world to a brigand and an outlaw or an enforcer of peace.

In Ethiopia is now being waged a battle between modern military tactics and ancient cunning—a struggle between scientific mechanism of war on one hand and terrific natural obstacles combined with native guerrilla warfare on the other. Italy's 300,000 fighting men in East Africa are attempting to close in on the wild domain of Ethiopia's King of Kings and his barefooted tribesmen. But without oil and its by-products the men of Mussolini would fail.

Italy's soldiers embarked from their homeland in troopships that burned oil. Italy's warships, which safeguard her position in the Mediterranean, fuel with oil. Her motorized artillery, her trucks, her tanks—all these depend completely on oil and gasoline. Nor can Il Duce's planes make

These small tanks proved to be most efficient equipment of Italian army in its advance through northern Ethiopia. If Italy's oil supply were cut off, the tanks would be useless. Army would have to resort to mules.

threatens the WORLD

This ship, the *Oregon*, being loaded with gasoline at San Pedro, thrust the U. S. into the international court tangle over oil. Crew. [redacted] cargo was consigned for Italy's army, appealed to Secretary of State Hull for guidance. They were advised no guarantee of safety of crew could be given if ship was bound for the war area.

Photo (left) copyright N. A. N. A.

Sudden air assaults have resulted in important Italian victories. Without gasoline these ships (left) would be unable to aid ground forces. Each plane is estimated to use 20 gallons an hour in flight.

●

Ethiopian anti-aircraft gunners (below) could carry on guerrilla warfare should Italian army be forced to advance without aid of oil for tanks, trucks, airplanes.

bombing sorties over the Ethiopian wilderness without these essential petroleum products. Mussolini's whole scheme of war is built around oil—and Italy, the poorest of major powers in natural resources, has no oil of her own.

Italy's strength—her superior machinery of war—is also her weakness. It makes her utterly dependent on oil—oil which she must buy from other nations. And her supply of oil is now imperilled by the threat of sanctions which may be imposed by other powers.

Here is where oil changes from a mere factor in an African embroilment to a worldwide menace. Italy's powerful dictator is determined to push to a successful finish his campaign in Ethiopia. Face to face with the possibility that his precious imports of oil may be shut off, Mussolini has stated unequivocally that grave international complications might ensue. There

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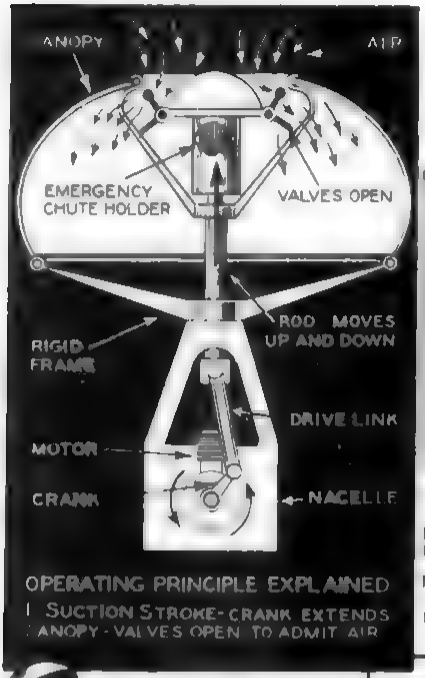
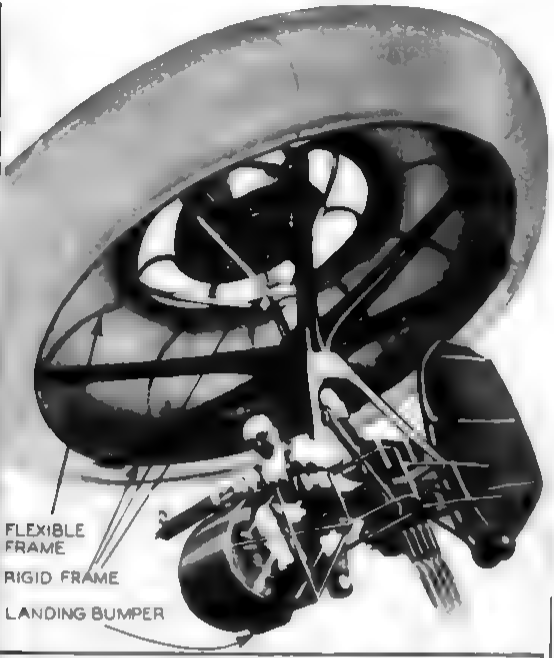
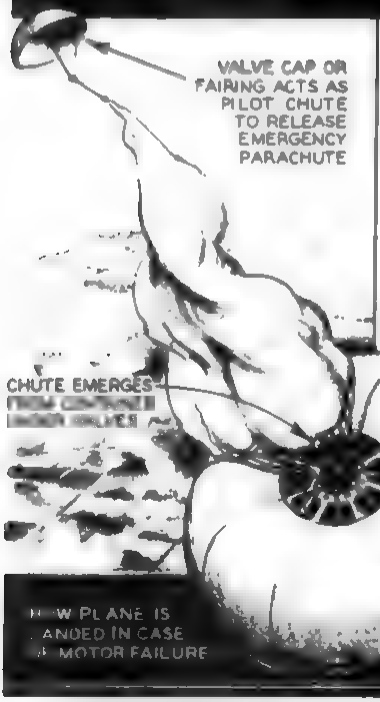
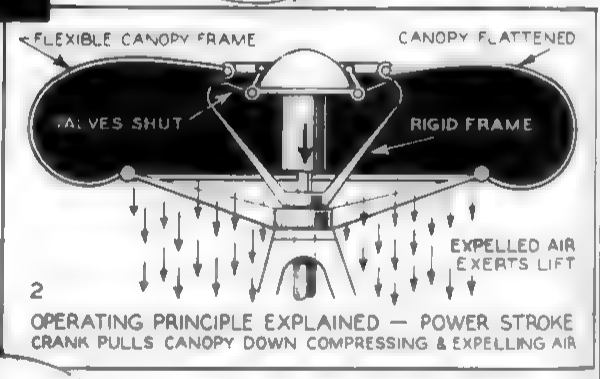
Artillery Spotter Has Vertical Lift









Puissing through the skies in much the same manner as employed by the jellyfish in propelling itself through water, a weird parachute artillery spotter is expected by its inventor, John A. Demosjay of New York City, to supersede the ordinary kite-balloon in observation work during war.

Greater maneuverability with resultant greater safety for the pilot, economy, and the elimination of ground crews are among the advantages claimed for this type of craft.

The parachute artillery spotter consists of a double canopy mounted on rigid annular frames, the upper portion being capable of an up and down motion which is obtained by means of a crank and piston rod. Driving power for the piston is supplied by a modified gasoline engine. A complicated set of valves centered about a circular aperture in the top of the canopy controls the air pressure exerted with the descending stroke. In an emergency a parachute will lower the craft safely.

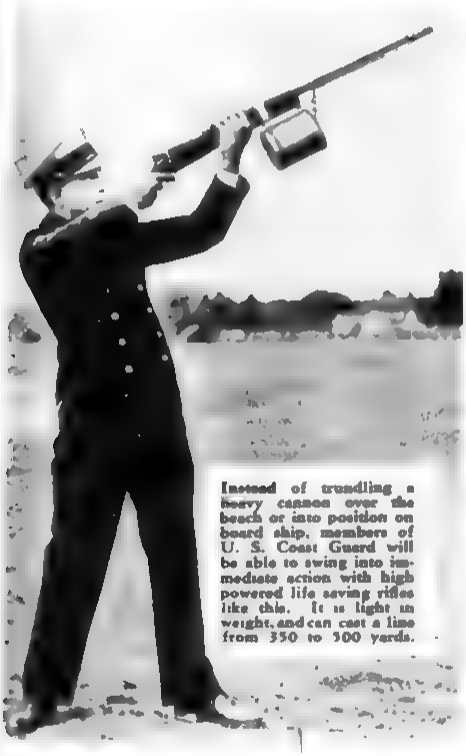
Highway Illumination System Sets New Standard In Safety

HORRIFIED by the increasing toll of lives taken by motorists blinded by lights of oncoming cars, highway lighting engineers are carefully studying a new lighting system installed over Highway 422 at Chagrin Falls, Ohio, as a possible solution to the problem.

Oval shaped reflectors spread the beam of a 400-candlepower incandescent lamp with which each unit is equipped up and down the highway only, and not to either side. The units are spaced 125 feet apart, and cast no glare in the eyes of motorists.

The effectiveness of the new type of highway illumination is clearly revealed by this unretouched snapshot. Details stand out with the clarity of daylight, and yet there is no glare.

Life Saving Rifle Replaces Cannon



Instead of trundling a heavy cannon over the beach or into position on board ship, members of U. S. Coast Guard will be able to swing into immediate action with high powered life saving rifles like this. It is light in weight, and can cast a line from 350 to 500 yards.

HIGH-POWERED life saving rifles will be used by the United States Coast Guard in place of the cumbersome cannons now used to throw rescue lines to ships in distress.

The new rifles, weighing little more than the regulation army rifle, can be fired from the shoulder, and will cast a line from 350 to 500 yards. It can be used from the beach where the use of the old style cannon was often out of the question.

Burrowing Bell Seeks Sunken Gold

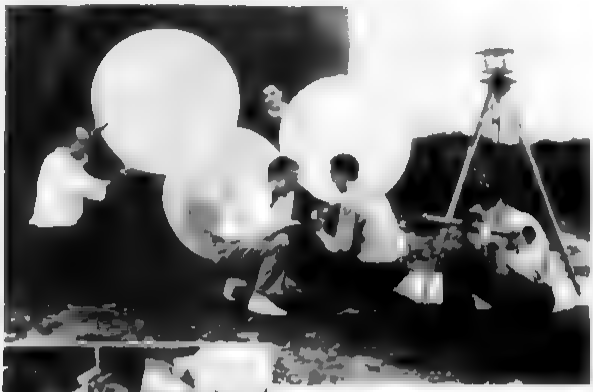
THE lure of gold at the bottom of the sea has resulted in one more invention, this one being in the shape of a diving bell designed to burrow deep into the sands of the ocean floor.

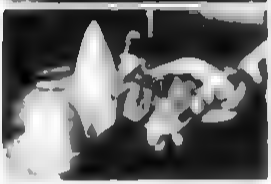
The burrowing bell is the invention of W. vanWienen, a Dutch engineer, and it will be given its first practical test when it attempts to recover the treasure lost with the sinking of the Spanish Armada off the coast of Scotland.

A large tube from the mother ship above will give entrance to the bell, which will be illuminated and in constant telephone communication with the ship. High-pressure water jets will force the sand away as the bell is lowered, while side jets will prevent the sand from closing in above.

This is a new type of diving bell invented in Holland which is to be used in recovering sunken treasure. Water jets will enable it to force its way into the sands of the ocean floor.

Robot Weatherman In Shell Radios Findings from Balloon





While Chief Observer S. Pagliuca and Lieut. Greves of the U. S. Coast Guard prepare the weather balloons, Dr. Carl Lange, research associate, and Arthur Brent of the Harvard Meteorological Observatory prepare the new radio meteorograph for a trip aloft. Left—Two views of the shell shaped meteorograph which signals the temperature, humidity, and barometric pressure at 30 second intervals.

A ROBOT weatherman encased in an 8-inch shell journeys aloft daily in a balloon, records the temperatures of the upper levels, the humidity and the barometric pressures, and then broadcasts the results of its findings every thirty seconds.

The entire floating weather bureau weighs but three pounds. Included in the tiny bureau are a thermometer, a barometer, a hygrometer, and the radio device which signals the readings of the three instruments to the ground station below.

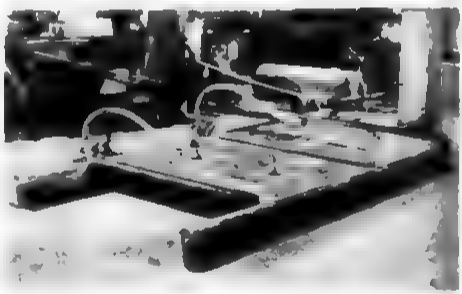
The aerial device is called the meteorograph, while the ground machine which receives the signals and records them on a weather chart is called the chronograph. The two machines were perfected at the Harvard Blue Hill Meteorological Observatory, and will be used for more accurate forecasting.

Electrical Outlet Is Continuous

A DECORATIVE moulding for home or office consists of a complete wiring system in itself, with openings for plugging in various types of electrical appliances every 6 inches. The moulding strip has two metal channels for the wires, and is covered with a bakelite cap containing the plug openings. It takes the place of all other wiring needed for the home, office or factory.

The moulding in this room is really a continuous electrical outlet strip with openings for plugging in electric appliances every 6 inches. It is a complete system for home or office.

Vacuum Process Hardens Concrete

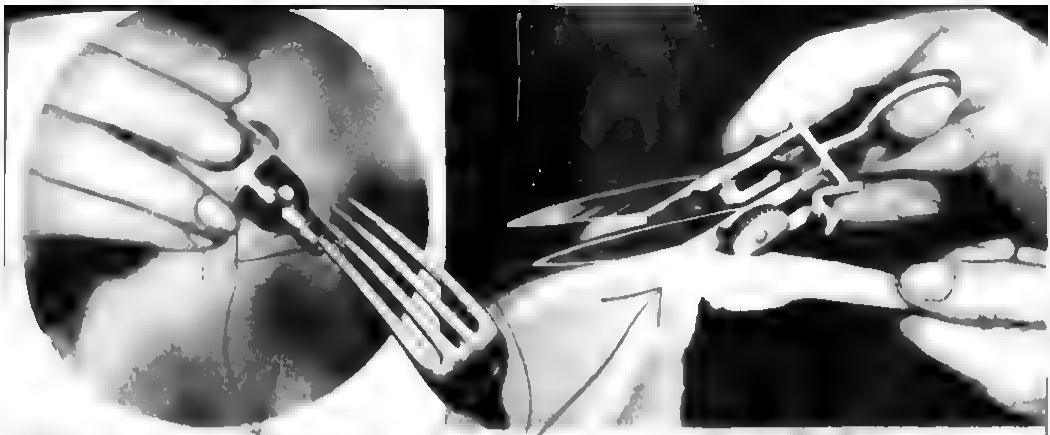


This weird vacuum device strengthens concrete by as much a 100 per cent by sucking out the excess water, leaving the fresh concrete dry, hard, and non-porous in twenty minutes.

CONCRETE from 30 to 100 per cent stronger than any now in use has been produced through the use of a new vacuum process developed by Karl P. Billner, civil engineer of New York City.

All types of concrete are strengthened by use of the new process. As fresh concrete is cast a metal and rubber mat equipped with suction cups draws out all the excess water, leaving concrete hard and dry in 20 minutes.

The strengthening action takes place when the concrete is sucked down to occupy the space formerly occupied by water, and which would normally remain porous after drying.



Inventors Improve Household Gadgets

A [illegible] may be adjusted to cut ribbons in widths ranging from a quarter inch to two inches in supplying the need of dressmakers for such an article. It is shown in action in upper right.

SHARP FORK TINES soon become dull. As a result a sharpener has been invented to maintain kitchen forks in perfect shape. As shown in upper left, the sharpener contains a cone of file edge ribs.

AN ADJUSTABLE THIMBLE is the answer to the tailor or seamstress whose fingers often vary in size from day to day. A tiny set screw, turned with the needle, adjusts a thin metal lining in the thimble to fit the finger.

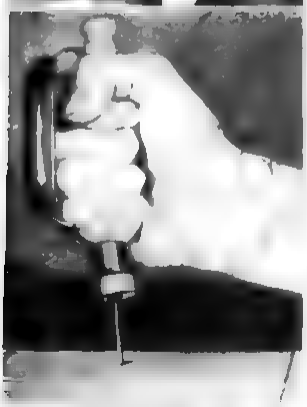
SANDPAPER SHOE SOLES, applied as shown at right, are now on the market to aid pedestrians in overcoming the hazards of slippery walks.

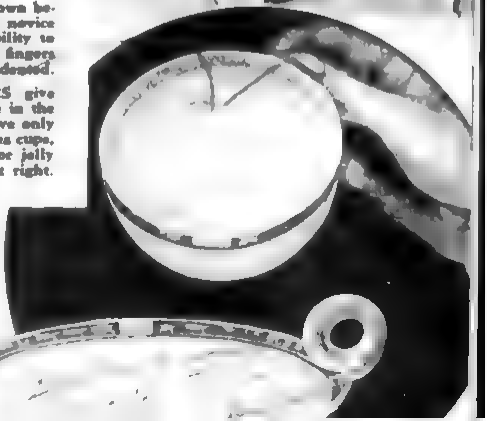
THE FIST HAMMER is being greeted with sighs of relief by housewives who dread the thought of injured fingers when hammering.

A SECRET NECKTIE POCKET has been designed to fool the pickpocket. The little pocket, as shown at right, is hidden in the lower part of the tie where it is concealed by folds of the fabric on both sides.

THE METAL FINGERS shown below are another aid for the novice carpenter who doubts his ability to hit the nail accurately. The fingers are light and not easily dented.

HANDLES FOR SAUCERS give that popular dish a dual role in the home. It no longer need serve only as a container for coffee and tea cups, but can be used as a relish or jelly dish as well. It is shown at right.





TACKLE for OCEAN

SO COMPLEX and various is the tackle used in saltwater fishing that a study of the same must be made if one is to have anything more than passing success in this branch of the universal pastime. It is one thing to select rods, reels, lines, lures, etc., for the lesser saltwater fish, but quite another to pick the tackle for the larger fish. The range is a great one, extending from the marlin, sailfish and tarpon, on down to the sea trout, snook and channel bass. The larger fish require tackle that is more or less specialized. In late years there has been a most extensive use of tackle such as is used in fresh water bass fishing in the taking of the smaller sea fish. Nine out of ten salt water anglers are using the lighter tackle. There is, of course, a disposition among practiced anglers to use comparatively light tackle in taking large fish of the ocean or gulf variety, but this is something that is beyond the pale of the average angler's ability. In the simplified survey of the subject given below will be found the tackle with which the average angler will be most successful.

Marlin Swordfish: Preferably a double enamel rod, tip 61 inches; weight 16 ounces; butt 20 inches. Should have a screw locking reel band. Butt, detachable, and of white hickory. *Reel:* No. 6/0, possessing a gear ratio 2½ to 1. The Atlapac type of reel suggested. *Hook:* The 8/0 to 10/0 spring steel, hand-forged hooks recommended. *Line:* Cuttyhunk 15 to 30 thread. Record marlin—1,040 pounds.

Sailfish: Single enamel rod is all right for this fish, tip 61 inches, butt 18 inches or 20 inches as desired; weight 9 to 14 ounces. *Reel:* No. 6/0, same as for marlin swordfish. *Hook:* Sobey, 7/0 to 9/0. *Line:* 9 to 30 thread. Record sailfish—180 pounds.

Tarpon: Marlin or sailfish tackle will be found suited for the tarpon. Record tarpon —232 pounds.

Tuna: Use tackle of marlin specifications. Record tuna—956 pounds.

California Yellowtail: Single enamel rod suggested, tip length, 61 inches, butt 18 inches, weight 9 ounces or one of 60 inches to tip, butt 14 inches and weight 6 ounces. The latter, by the way, conforms with the Light Tackle specifications in vogue at Cata-

The sea bass, or jewfish as it is often called, grows even larger than this fine specimen. The record sea bass taken on line weighed 607 lbs

The marlin swordfish, described as the greatest warrior of them all. As the line draws tight, this fierce battler hurls himself out of the water in a desperate attempt to shake off the hook

and GULF FISHING

by ROBERT PAGE LINCOLN

While northern lakes are locked in ice, giant warriors in southern waters stand ready to do battle with any fisherman.

lins. A heavier tip of 12 ounces is suggested for the amateur. *Reel:* Either the 6/0 or the 4/0 reel suggested according to the weight of the rod, and its specifications as outlined in the above. *Hook:* The Sobey, O'Shaughnessy, or Tartuna snells are a suggestion. *Line:* Cuttyhunk, 9 to 30 thread. Record yellowtail—111 pounds.

Sea Bass or Jewfish: The largest jewfish caught on fishing tackle is said to have weighed 603 pounds. While caught with hook, line and rod and reel, is more often still-fished for around sunken ships, underwater rock reefs, around pilings, bridges, etc. Handline is most practical. Use the heaviest Cuttyhunk line obtainable, preferably 39 thread. *Hook:* Shark size, 10/0 to 12/0. If the rod is used it should be in the 20-ounce class.

Cravalle: This member of the pompano family often grows to a hundred or more pounds in weight. The largest taken on hook and line weighed 109 pounds. Much fishing for the jack cravalle is done by bait casting, hence no special recommendation is made as each fishing section has its choice. The fisherman generally finds out what is being used where he is fishing and outfits accordingly.

Kingfish: This member of the mackerel family often operates in schools, which, when located, provide fast and furious fishing that is no end of excitement. Trolling rods of the saltwater type, 9 to 12 ounces in weight are often used, with a 250 to 300 yard ocean reel, or smaller if desired. *Hooks:* Mostly 6/0 to 7/0, to which is connected strip bait cut from certain small fish. Strips cut from white rags often do as well, while a wide variety of

[*Continued on page* 118]

Vieing with the marlin for fighting honors are the tarpon, the silver streaks of the Gulf of Mexico. Two men battled these beauties for hours before bringing them to gaff. Left—Here is a scene on the bridge crossing the bay at St. Petersburg, Fla., where huge crowds assemble daily to still fish for snook.

Taxidermist Gives *Eternal Life* To Birds

John Schleisser (above) smooths down the feathers on a "rebuilt" American eagle, captured by him on a Mexican trip

With deft touches Schleisser restores natural color to the lips and nostrils of a deer head. Part of his personal collection of mounted birds and animals is in this room.

ARMED only with a forked stick, a hunter walked warily through the squat bushes of the San Fernando valley in Southern California the other day. Suddenly he froze in his tracks, warned by a series of rattles that hidden danger lay waiting.

He advanced slowly, saw a Pacific rattle snake lying coiled and ready to strike. With the skill acquired from many such hunts, he pressed the stick down over the snake's neck, stuffed the reptile into a box, and hastened back to his Hollywood studio.

There John Schleisser, famed naturalist-taxidermist—for it was he who captured the deadly reptile—chloroformed the rattler. A few minutes later he could be seen taking exact measurements by making a plaster cast of the body. Then he skinned the rattler, made a mannikin of papier mache duplicating the late deceased, and a few days later fitted the skin, perfectly tanned, back over the artificial body.

Simple though this sounds, the unusual gift of this man is his ability to restore reptiles, birds, and animals to lifelike poses, giving them the appearance of life even after death.

Schleisser for 39 years has been giving life to the dead, at least in appearance. How many thousands of specimens he has captured or killed in far-away parts of the globe not even he can calculate. His "restorations" may be seen in famous museums of the world, from African animals of the famed Count Samuel Teleky's collection in Budapest to Col. Peary's northern Caribou in the New York Museum of Natural History.

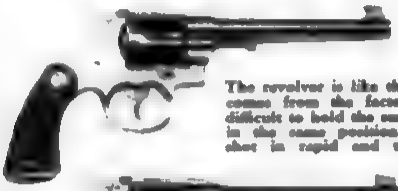
But the list does not end here. Walk into the Brooklyn Museum and you will see Canadian moose and wolves to which he has given eternal personalities. In the St. Louis Museum are great pythons and anacondas given permanent form under his skilled hands.

Such an ordinary creature as a barn owl is one of his prized recreations. In this size of bird he removes the skin, duplicates the body with wound excelsior, replaces the skin and paints the features with the natural colors of life. Large birds such as the ostrich he "builds" with papier mache, using the skin and feathers as covering.

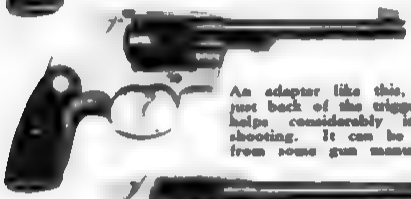
How I Make Special Revolver Grips

by ALBERT C. MURPHY

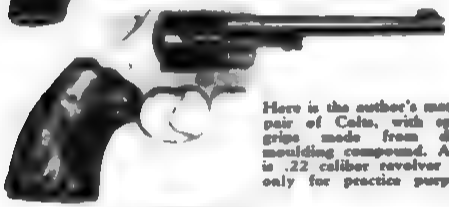
Conn. State Revolver Champion, 1935



The revolver is like this when it comes from the factory. It is difficult to hold the small handle in the same position for each shot in rapid and timed fire.



An adapter like this, [illegible] just back of the trigger guard, helps considerably in match shooting. It can be obtained from some gun manufacturers.



Here is the author's matched pair of Colts, with special grips made from dental moulding compound. Above is .22 caliber revolver used only for practice purposes.

This gun, a .38 special caliber, was used by the author to win Connecticut State Revolver Championship over National Match Course. Matched guns permit practice with cheap ammunition.

The author shooting the 50-yard stage of the State Championship Revolver Match. Scope (on stand) is used to spot hits.

A revolver handle should feel like a cigarette package, not like a milk bottle cap. Mold your grip to give it this feel.

THEY say it is even necessary to hold your ears right in competitive revolver match shooting, where you strive to put ten shots into the one inch ring at 60 feet, but you must at least master the technique of holding, breathing, sighting, standing, and squeezing.

Dissatisfied with results after learning these fundamentals, I decided my revolver handles were too small. I could feel the gun slip a little in my hand as I cocked it during rapid and timed fire. I wanted a large handle that would fit my hand perfectly.

Securing a box of Keer Impression Compound from a dentist friend (this is used by dentists to take an impression of a patient's mouth for fitting plates) I placed four slabs in a pan of hot water, then kneaded the soft material in my hands to form a smooth round ball. Quickly flattening this out, I wrapped it around the revolver handle, shaping it with the fingers, then holding the gun in shooting position. The material hardens rapidly, but can be softened again and reshaped by holding over a gas stove flame.

There should be a "squarish" feel to the grip, with the palm of the hand and the finger tips entirely away from the stock. There is a large cord in your trigger finger that sometimes deflects the gun when pressure is applied to the trigger. This is one reason why so many of a beginner's shots strike to the left of the bull's-eye. The grips used on my guns are foolproof in this respect.

Ambulance Tank Will Battle Hurricanes In Rescue Work

This is not a tank of war but a fortified ambulance for use in the hurricane belt of Florida. It can travel on land or water in the thick of the storm to carry on rescue work.

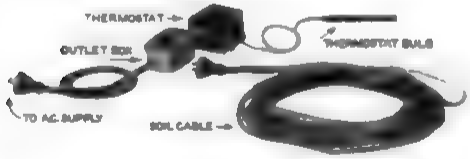
HURRICANES or floods mean nothing to a six-ton ambulance tank designed for rescue work in the Florida storm belt. The great machine, resembling a monstrous war tank, will travel on water or land, stalk unwaveringly through the fiercest wind undaunted by flying debris and carry hospital supplies to stricken areas without waiting for the storm to cease.

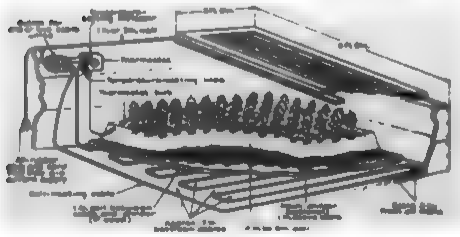
The mercy tank was designed by Donald Roebling for his father, J. A. Roebling of Lake Placid, Fla. It is 24 feet long, 8 feet wide and contains a large compartment for rescuers and supplies. It has a 110-horsepower motor to drive the caterpillar treads.

Small Kit Keeps Garden Plot Warm

THAT small growers and amateur hobby gardeners might enjoy the same facilities afforded the large hot house grower, an all-electric soil heating kit is now being manufactured for use in plots of 36 square feet or [illegible].

The kit contains 60 feet of cable containing a No. 19 resistance wire core. The cable is woven back and forth over the garden plot to be heated, and is then covered with 6 inches of soil. A thermostat bulb, half buried in the ground, keeps the temperature at a point best suited for the plants.





Here is a new soil heating kit designed for the small grower and plant fancier. The cut-away drawing shows kit installed in a hot bed. It maintains temperatures up to 100 degrees.

Furniture Men Design New Mirror

By means of this portable mirror Milady can see the back of her head while arranging her hair. This latest convenience was exhibited recently at the Furniture Mart in Chicago.

NEW refinements in furniture were evident at the recent showing of new styles at the American Furniture Mart in Chicago. Of particular interest to women was a gracefully designed portable mirror on a stand which could be arranged in any position. The new portable mirror thus cast a reflection into the dressing table mirror which enabled the woman seated there to see the back of her head while arranging her hair.

Unique Operation Narrows Building

A STREET widening project usually means that all buildings fronting on the avenue will have a generous portion of their structure sliced off to make way for the new improvement. Not so in the case of the 13-story Commercial Exchange Building of Los Angeles.

When city engineers decided the building projected too far into the street, architects decided that the slice, instead of being taken from the front of the building, should be taken from the center and the two halves then pushed together. This, they pointed out, would mean only the elimination of one small store on the first floor and a few unnecessary halls and alcoves on the succeeding floors.

The building was accordingly sliced up the center, and the two halves are now in the process of being pushed together. Not only was the task found to be more economical, but work going on in both halves of the building was uninterrupted.

When it became necessary to widen the street, this 13-story building had a slice taken out of the middle instead of the front. The two halves are now being pushed together.

Speed Bike Has Natural Airlines

This is the new streamlined bicycle designed in England. The rider practically lays down on his machine to reach the pedals set behind the rear wheel. Note the close-set wheels.

NATURAL streamlining is accomplished in a new type of bicycle designed in England for use on the speedways. Aware of the discomfort suffered by racers who must remain humped up over their machines for long periods to reduce air resistance, the designer has placed the drive pedals behind the rear wheel. The handlebars are lowered almost to the level of the front axle.

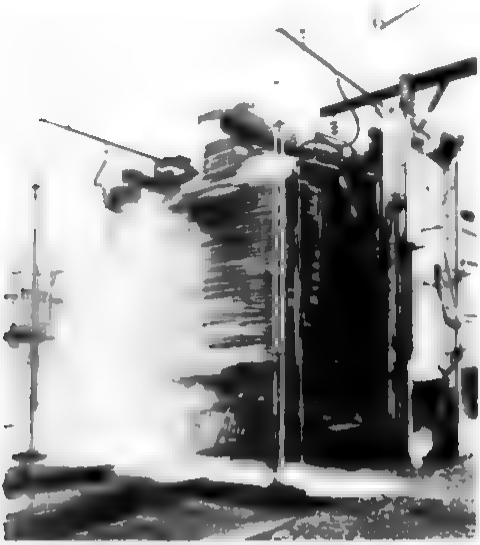
In this posture the rider is almost horizontal to the ground and in a naturally streamlined position. It is believed the new machine will produce speeds far in excess of anything yet accomplished.

Movie Star Designs Bedroom Set

DICK POWELL, keeping a close eye on the furniture used on various movie sets, has designed his own bedroom and fitted it with those items which he found most desirable for his own use. Though the bedroom, with all its appointments, reflects the last word in luxury, there is scarcely an item in it which cannot be duplicated by the home workshop fan.

Here is a view of Dick Powell's bedroom showing how the star has combined the furniture features of various movie sets. Everything shown can be duplicated in the home workshop.

Shower-bath and Train Polisher Shine Up Railroad Coaches



Shower-baths for railroad trains may sound incongruous but engineers of the Reading railroad have found them effective in keeping coaches clean. This photo shows how they work.

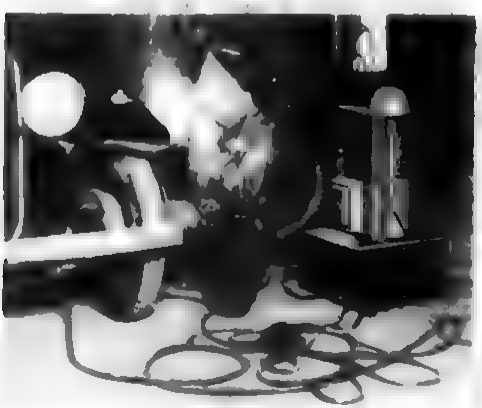
TAKING their cue from the electric shoe polishing machine, engineers of the Reading railroad have devised a train polishing machine which thoroughly cleans the exterior of the cars at a single passage.

Frameworks at both sides of the track support a series of revolving brushes between which the coaches are drawn. Powerful jets of water, like vertical shower baths, rinse off the dust and grime loosened by the brushes.

A train which would normally occupy a crew of car washers for several hours can be cleaned in a few minutes by the train polisher.

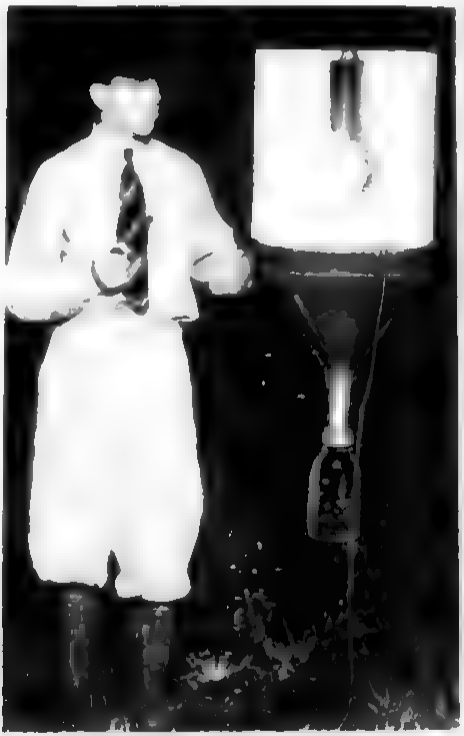
Midget Welder Handles Big Jobs

A MIDGET electric welding machine which can handle practically any welding job accomplished on the larger machine is now being manufactured for use in small shops and garages. Though many of the parts are actually smaller than those used on the larger machine, much space has been saved by mounting the units vertically. It can be bolted to the floor or mounted on wheels.



Compact and portable, this midget electric welding machine has been specially designed for general repair work in small shops. The unit in rear of workman houses all the machinery.

Purple Glow Lures Japanese Beetle



Here is a new foe for Japanese beetles, an ultra-violet lamp combined with trap. One trap caught 36,500 beetles in a single night. The pests are unable to resist the purple light.

A NEW type of ultra-violet lamp combined with a special trap has been developed jointly by government scientists and a large manufacturer to wipe out the Japanese beetle. The lamp sheds a peculiar purple glow which the insects are unable to resist.

AVIATION NEEDS INVENTIONS TO SOLVE ITS PROBLEMS

Post Office Department is seeking an effective method of picking up and delivering mail by plane. A device is needed to silence airplane motors to simplify soundproofing and passengers need parachutes that will open automatically. For patent advice address Patent Editor, Modern Mechanix and Inventions Magazine, Fawcett Building, Greenwich, Conn. Enclose stamped, self-addressed envelope for reply. Do not send any models to the Patent Editor.

A GREAT industry is begging for new inventions! Millions of dollars of invested capital are waiting to be augmented by millions more just as soon as the American inventor can supply the aeronautical industry with inventions that will make flying safer, surer, faster and less expensive. These inventions need not come from technical men connected with the industry. Millions of mechanically inclined persons have an opportunity to solve the problems of aviation.

The fool-proof gas gauge is still to be invented for airplane use. When an autoist runs out of gas, it merely means a walk or a hitch hike to the nearest station. When a flyer runs out of gas, it may mean death. Gas gauges must not lie.

The problem of the clean, frost and ice free windshield is also far more important to the pilot than to the motorist. Hence the cry goes out for a more perfect means of keeping the windshields of airplanes free from rain and ice. Expense is no object in this connection as it might be in the case of the automobile.

Exploding gasoline tanks in crashes present one of the difficulties which the inventor should be able to overcome. Either a new and explosion-proof gas tank is needed or a method of localizing the effects of bursting tanks.

The Post Office Department of the United States Government is ready and indeed willing to conclude a most profitable deal with any inventor who can suggest the right method of delivering mail bags to airplanes in flying pick-ups. A method of dropping mail is also needed. In the perfection of this

[*Continued on page* 124]

Keeping the FIREMEN

by EMMETT A. SCANLAN,
Chief Inspector,
Bureau of Fire Prevention, Kansas City, Mo.

A cracked or defective flue may start a fire which will spread along joists and between floors until the entire house is affected, as was the case in the photo above. Right—If flue leaks as a result of house settling, check it for cracks through which sparks can escape and ignite rafters in attic or floors.

In photo above Chief John J. Nee of Kansas City demonstrates safe way to open door leading into burning hallway. Note how door is blocked by foot to prevent heated air from blasting door open.

THE clang of fire bells and the crescendo screech of sirens disturb the peaceful calm of a winter night. Rushing to your bedroom window you look out to find a neighbor's home in flames.

Thick black smoke hangs low about the roof. As the winds blow it aside for a moment you see the form of a woman in a second floor window, a child in her arms. Tongues of flame leap about the window frame and as the smoke closes around them again you hear the woman's frantic cries for help.

A fire department truck rounds the corner. A ladder is run up to the trapped pair and in less time than it takes to tell it, firemen have carried the frightened woman and child to safety.

However, it isn't often that tragedy can be averted in a case like this. When this woman was awakened and smelled smoke she instinctively did the wrong thing. Luck, alone, saved her.

She made her first mistake when she rushed to the bedroom door and threw it open. A gust of smoke and hot air lashed at her through the doorway. Terrorized she fled to a window, leaving the door into the hall standing open. This was her second serious mistake.

Had the fire gained greater headway, the hot air in the hallway would have killed her the instant she took a breath. Often, in the case of a fire in the basement the flames may not reach above the first floor, but the smoke and air will expand under the terrific heat and rise. Terrifically heated air will cause death by searing the lungs. The expanding air and smoke exerts a tremendous force which will blow a door open like a gust of

Away from Your Doo

Fire—your home's greatest enemy—can be prevented. In this article an expert outlines worthwhile suggestions on fire prevention.

Use care when handling gasoline for cleaning purposes. Static electricity, gas stove pilot light, or electric switch can ignite vapors. Ashes piled near wood or paper may cause a serious fire. Keep ashes in galvanized iron containers.

This fire was caused by spontaneous combustion. Do not keep oily rags or greasy clothes in garage.

wind when the knob is turned. It is important, then, should you ever find yourself in a like situation, to observe certain precautions.

First take stock of the situation by placing your open hand on the paneling of the door to see if it is hot. If you can feel the heat from the hallway through the door, DON'T UNDER ANY CIRCUMSTANCES OPEN IT. Death is the almost certain result. If you are unable to feel heat, you may open the door to extend your investigations, but it is still necessary to exercise great caution.

To prevent the door from blowing open by the force of hot air which may be present, but undetectable, place your foot against it. Stand at arm's length from the knob and with your back to the door. Then, using the door as a shield, cautiously turn the knob and open the door a fraction of an inch.

If there is a rush of smoke and scorching air, slam the door shut, immediately. Your best chance is to wait in your room for rescuers. In order to admit as much air as possible to keep down the temperature in the room break the glass out of the windows with a chair. Whatever you do don't jump until you are no longer able to stand the heat and smoke. Even then it is better to attempt to

[*Continued on page* 128]

New Film Records, Reproduces Sound Without Processing

This machine records sound on film, and then, without processing, reproduces the sound when the film is reversed. Operated in conjunction with concealed microphones, it may be used by police in gathering evidence against criminals.

THE use of film as a means of recording sound has been advanced another step with the invention of a new device by J Ripley Kiel of Chicago. So delicate is his machine that the slightest sound audible to the human ear is immediately registered on the film.

The apparatus employs a 16-MM cellulose acetate film upon which the sound waves are embossed instead of registered as light waves as is the case with ordinary sound film. The sound may be immediately played back without processing the film.

Ice Box Flowers Rival Nature's Own

VELVETY artificial flowers which rival real flowers in natural appearance have introduced a new source of income in this country. The new flower is made of tsuso paper, a product of the pith of the bamboo tree. When wilted, the blooms are restored by a visit to the ice box.

The tsuso paper comes in the form of snow-like, lustrous sheets similar to fish meal. The sheets are cut into small squares, and dyed in a solution of dye, castor oil, acetic acid, water and alcohol. The colored squares are cut into leaves and petals on a hand press.

Traveling Furnace Bakes Clay Road

AUSTRALIAN highway engineers have discovered a new way of utilizing the adobe clay soil over which many of their new highways must be run. Instead of paving it, they are driving over it at the rate of 10 feet an hour with a traveling down-draft furnace which leaves behind it a solid road of baked "brick." Sharp points of fused brick are broken down with a roller, and the cracks are filled in with clay. The process is still in the experimental stage.

Left—Here flower petals are being cut from the tsuso paper squares with a heavy dye. The rest is handwork.

Above—The flowers worn by this young lady look real, but they are made of tsuso paper. When they droop they are placed in the ice box and quickly recover. Left—Colored squares, when held together with clamps like this, can be dyed with a second color. The second dye penetrates only far enough to tint outer edges.

FOUR NEW HOME INVENTIONS:

Tearless Onion Peeler, Student Stove, 2-Way Lamp, & Whistling Kettle

WEEP-NOT ONION PEELER, invented by Mrs. Vera Vach of Minneapolis, Minn., solves the home onion-peeling problem. Onions are inserted on prongs in the container, the cover is fixed on, and the crank on the outside turned a few times to neatly pare the outer covering from any onion, large or small, without filling the kitchen with tear-producing gases. Container is filled with water. Miss Florence Sussg is shown about to try out the new invention.

WHISTLING KETTLE boils a quart of water in less than six minutes, whistling cheerily when water is ready for tea-making. Should kettle boil dry, current will be cut off automatically to prevent damage to kettle. Unit plugs into any wall outlet, drawing 1,350 watts. Spout opens when kettle is lifted

INVERTIBLE BRIDGE LAMP changes the lighting of a room to suit the occasion. There are two bulbs, larger being turned on by automatic mercury switch when lamp is inverted.

APARTMENT STOVE not much larger than a dollhouse stove is now available for one-room apartments and student rooms.

The addresses of the manufacturers or inventors of any product on this page or elsewhere in this issue can be obtained free on request if a stamped, self-addressed envelope is enclosed. Address Modern Mechanix Publishing Co., Fawcett Bldg., Greenwich, Conn.

London Hospital Constructs $200,000 Radium Mercy Bomb

Here is a new type of bomb under construction, a $200,000 radium bomb which soothes and heals rather than rends and destroys. It will be used in Westminster Hospital, London.

CONTINUING the work begun by the late Madame Curie, eminent French pioneer in the use of radium for healing, physicists at the Westminster Hospital in London are now engaged in the construction of a $200,000 radium bomb which will greatly extend the mercy work of the beneficial rays.

The 4 grammes of radium, worth $200,000, will be encased in a new tungsten alloy shell, the alloy having 1½ times the density of lead. Within the shell will be a solid gold collar to further confine the Gamma rays of radium, thus preventing injury to the operators from spreading rays.

The employment of so great a quantity of radium within a single bomb permits operation at a greater distance from the patient, and at the same time produces a more effective treatment at greater depths below the body surface.

Radiogram Gives 6-Hour Program

CONTINUOUS entertainment for 5 or 6 hours is possible with a new radiogram fitted with a record changer that can play as many as 500 records without interruption. The device is the product of three English inventors who estimate their product is so simple to build that it can be marketed for less than $100. They exhibited it in London

This radiogram can play continuously for 6 hours, automatically changing as many as 500 records. It was invented by, from left to right, H. Winkwood, J. F. Southgate, and F. H. Miller, all of England. It operates entirely by electricity.

Radio Gets Robot Sound Technician

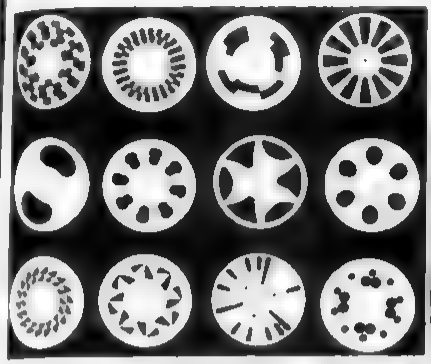
This is the robot sound effects technician. The two records contain an assortment of "command" noises, any three of which can be picked up by the three arms and blended.

A ROBOT sound effects technician for broadcasting studios has been perfected to eliminate more than 800 gadgets now required in the presentation of various programs.

The new device consists of two turntables for records and three automatic pick-up arms. Each record is divided into numerous channels, and each channel contains a special bit of sound, such as street noises, gurgling water, railroad trains, and the like.

In the event the program called for a street parade in a large city, one pick-up arm would be placed on a street noise channel, another on the marching feet channel, and the third would pick up martial music.

"Sketches" Sound; Files It For "Talkies"



Above are 12 types of "musical disks" designed for one system of synthetic sound. Disks are revolved as film moves through camera, resulting in patterns on sound track to produce music.

SYNTHETIC musical notes that can be filed away in a card index have been developed by a group of Soviet musicians and scientists. The hand-sketched notes, resembling combs, are used to produce musical accompaniment for motion picture films.

N. Voinov of Moscow sketched and cut out cardboard combs of the 80 semi-tones of the piano. By selecting the proper combs and photographing one after another in correct order on the sound track of a movie film, Voinov was able to produce any favorite piano melody.

E. Sholpo of Leningrad developed another method of producing synthetic sound. Instead of sketching individual notes, he prepared disks with cut out openings. The speed at which a disk is revolved when photographed determines the pitch of the sound. Notes of high pitch are produced by revolving the disk rapidly; low speeds produce low notes.

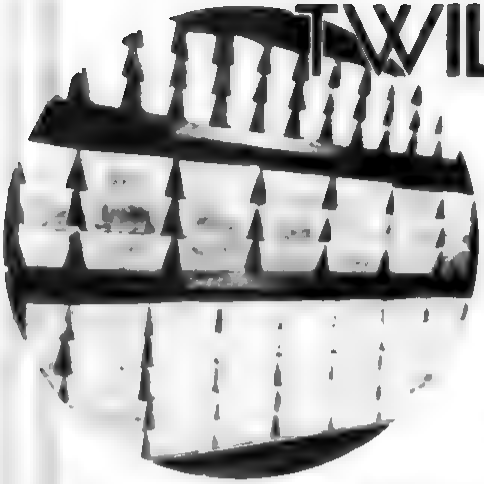
A third research worker has found an interesting experimental line in the same field. He made sound track photographs of ornamental designs to discover the resulting sounds. He found, for instance, that a sound track photograph of his own profile produced sounds similar to those of a violincello. His experiments led to the "retouching" of real sound tracks. His process enabled him to obtain truer notes from actual musical instruments.

Further development in these lines may result in the production of sound movies without the use of any musical instruments.

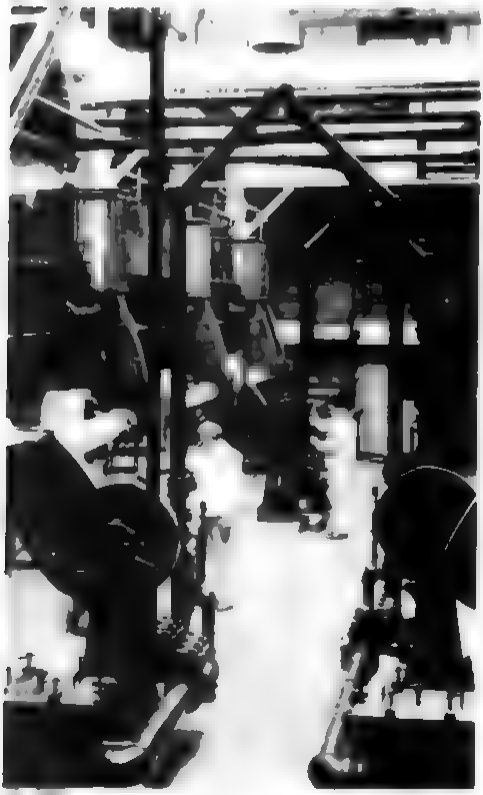
Above—Research worker with comb-shaped cut-outs, each representing a note for "artificial" production of music.

Two large sound tracks at left show comparison of natural and sketched sound. Ragged track at far left is chord do-mi-sol on piano. Next is same chord drawn by hand and photographed. Frames are from animated cartoon with sketched sound which produces the sound of marching feet.

TWILIGHT CITY...



Silver bars form the backbone of photography, the precious metal being the chief ingredient of films. At the Eastman plant, 200 tons are used annually, rivaling the United States mint in consumption. The bars above will last but 3 days.



Acid treated cotton and cotton solvents are combined in these mechanical mixers to produce "dope," which, after careful filtering, is converted into the transparent film base for the negative.

THE early amateur photographer carried a bulky apparatus in a portable, tent-shaped darkroom into which he plunged for a freshly-sensitized glass plate every time he wished to take a picture. Today's amateur, exposing some 500,000,000 snapshots yearly, has at his command a vast array of lightning-speed emulsions in convenient sizes and shapes, which are ready for instant use.

Let's drop in at Eastman's "twilight city" at Rochester, New York, the largest film manufacturing plant in the world, and discover how recent advances in science and mechanics have made this possible.

At Kodak Park more than four score buildings, covering 400 acres, carry on this large scale production. Six miles of paved streets run through the Park, and these streets are sprinkled constantly to eliminate the dust menace which will ruin freshly coated films and sensitized paper. So important is this fight against dust that full-time crews are employed to keep floors spotlessly clean with scrubbing and floor-waxing machines. Giant chimneys, rising over 360 feet into the air, carry away the fumes and dust from the 700 tons of coal consumed daily for power, refrigeration and heating. Sparkless and smokeless locomotives, charged with steam every couple of hours, operate over 15 miles of rails within the grounds. A 5,000,000-gallon reservoir supplies the 15,000,000 gallons of water required each day the gigantic plant is in operation.

The story behind the actual film-making begins in a huge vault where five tons of bar silver—a week's supply of the precious metal—may be stored for almost immediate consumption. These bars are sampled and scientific experts test it for impurities. Even the slightest amount of iron or copper found in the bullion may disrupt the entire production schedule if permitted to pass undetected.

Approximately 50 bars are dissolved in nitric acid each day for manufacturing use. The resulting fluid—silver nitrate solution—flows through tubing into the evaporating room where it is guided into evaporating bowls mounted atop steam-heated tables.

Water being driven from the solution by the intense heat, the silver nitrate begins to crystallize as the solution cools. Distilled water is then poured over the crystals and

Where Snapshots are Born

"It's easy to take a snapshot," as 500,000,000 pictures a year will testify. But behind the click of the lens there lies a story of high speed chemistry fascinating in its scope.

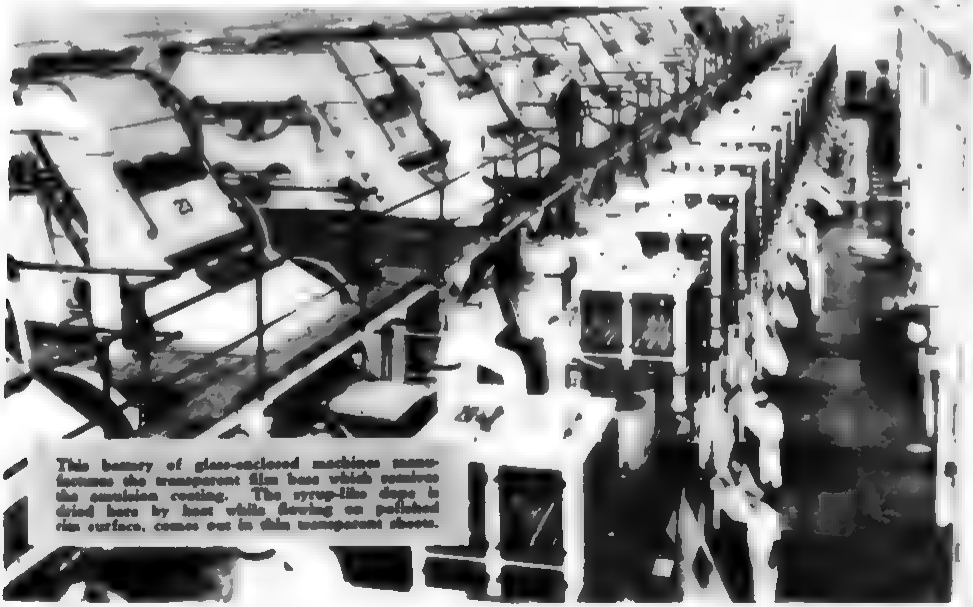
evaporation is repeated until all impurities are removed. The brittle, flaky crystals are next subjected to drying processes.

The cotton fields contribute their share in the manufacture of the film support or "base," for cotton treated with nitric and sulphuric acid until it becomes soluble in solvents such as wood alcohol is an important ingredient. About 80 tons of cotton are used a week in the manufacture of film base.

After samples are t e s t e d, the cotton is weighed and then dumped into the nitrating machines. To prevent possible contact with metal, the nitrated cotton, immersed in water, must pass only through tile pipes. After every trace of acid is removed by thorough washing, the nitrated cotton is dissolved in proper solvents in large mechanical mixers. Finally, the fluid is forced through filter presses.

This syrup-like "dope" is fed onto the highly polished rim surface of enormous wheels in a battery of glass-enclosed machines. Heated air drives off the solvents as the thin transparent layer travels through the machine. Cellulose nitrate is finally reeled off like newsprint paper in flawless, endless sheets. Workmen watch the entire process through the strong plate glass windows. These complicated machines, almost h u m a n in

Here is the evaporating room where silver nitrate solutions are purified by crystallization. The silver salts are then mixed with potassium bromide and pure gelatine and applied evenly on the film base.



This battery of glass-enclosed machines manufactures the transparent film base which receives the emulsion coating. The syrup-like dope is dried here by heat while flowing on polished rim surface, comes out in thin transparent sheets.

Chemistry is The Maker and Guardian of Films

operation, run continuously, day after day, without stopping.

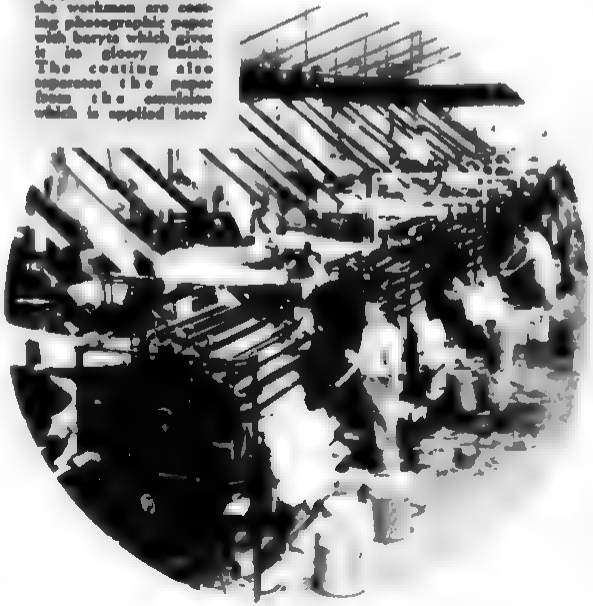
The cellulose acetate stock, better known as the slow-burning "safety film" widely used in home movies and x-ray films, is similarly made, except that acetic acid and acetic anhyride are substituted for the nitric and sulphuric acids.

The silver salts must now be applied evenly on the film surface, and gelatine—even purer than the kind served at the dinner table—is employed as an emulsion ingredient to hold the salts in suspension. Hides from cattle are used for the gelatine. The gelatine is blended and dissolved in water. Solutions of potassium bromide and silver nitrate are added to produce the light-sensitive silver bromide. Silver salt crystals are made to produce fast or slow emulsions by heating, and greater sensitivity to color by controlling the chemical and physical content. Nearly 100 different kinds of film are produced.

The base sheet which receives the thin emulsion coating is approximately 40 inches wide, the thickness of the coating depending on the type of film. Movie film is generally coated in full width and later slit and perforated in the desired 16 mm. or 35 mm. sizes. Most of the 35,000,000 x-rays

[*Continued on page 122*]

This giant machine punches out the tin containers for movie film. The [illegible] plant makes all its own supplies. Below—Here the workmen are coating photographic paper with baryta which gives it its glossy finish. The coating also separates the paper from the emulsion which is applied later



ODD FACTS ABOUT FILMS:

It is estimated that each year in the United States:

500,000,000 snapshots are taken by amateurs.

250,000 miles of motion picture films are consumed.

2,250,000,000 frames of amateur movies are shot.

1,500,000,000 frames of professional movies are made.

35,000,000 x-rays are taken.

4,500 acres of photographic paper are consumed.

Gelatine for film use must be purer than gelatine for food.

The red and black sheathing which covers each film roll is of better grade paper than the finest business stationery.

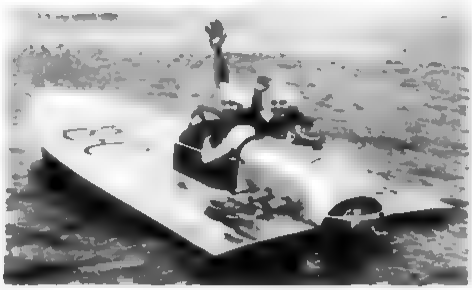
The Eastman plant is second only to the United States mint in silver consumption.

Eighty tons of cotton are used weekly in making the film base.

New Styling Adds Speed to V-8 Powered Inboard Boat

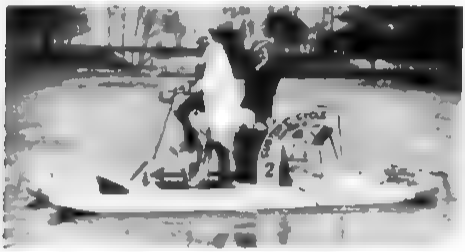
HAVING successfully passed all preliminary trials with flying colors, a radically new styled speed boat is now being groomed by Robert and Dorothy Munson, Arcadia, Calif., for the fall races.

The two-passenger flyer is 14 feet long and has a beam of 82 inches, giving it a pumpkin seed appearance in the water. The bottom is practically flat. The craft is powered with a V-8 motor mounted in the rear.



Robert and Dorothy Munson, brother and sister of Arcadia, California, are shown here as they give the final tests to their radically new styled speed boat. Note the wide beam.

C-Cycling Provides Water Thrills



C-cycling is the latest water sport to make its appearance this year. The craft is non-capsizable, and campers, fishermen and duck hunters like it because it leaves the hands free.

TWIN pontoons fourteen feet long furnish the floats for the latest device in water sports—the C-cycle. The C-cycle operates in water much like a bicycle on land, foot driven pedals propelling a paddle wheel mounted between the pontoons, while steering is accomplished by means of bicycle handle bars.

It carries two passengers and as the hands are free, the craft can be used for fishing, trolling, or duck hunting. The craft also provides a healthy medium for reducing the waist line.

Vets Invent Mechanical Hay Loader

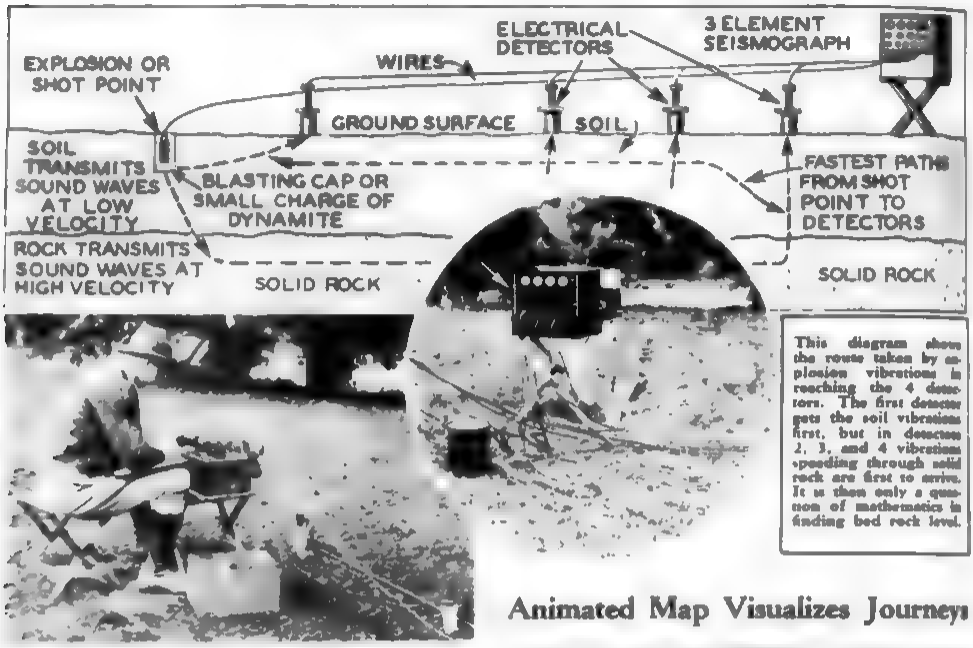
WHEN invalid veterans recuperating at the California State Veterans' home in Yountville found the task of haying too much for their strength, Col. Nelson M. Holderman, commandant, and Capt. Stanley Dunmyre invented the first tractor driven hay loader.

In operation the hay loader is much like the horse drawn hay bucker used on the western prairies, with the addition that the new loader not only bucks the hay into cocks but lifts the cocks up onto the hayrack as well.

Two long arms project from each side of the tractor and act as levers to buck and lift the hay. Across the ends of the arms is built a basket framework equipped with teeth on the lower side to slide along under the hay.

No more pitching hay by hand for the veterans at the California State Veterans home. Col. Nelson Holderman, commandant, and Capt. Stanley Dunmyre, invented first tractor driven hayloader to aid veterans in their annual summer's task.

Dynamite Earthquakes Find Bed Rock for Road Engineers



This diagram shows the route taken by explosion vibrations in reaching the 4 detectors. The first detector gets the soil vibrations first, but in detectors 2, 3, and 4 vibrations speeding through solid rock are first to arrive. It is then only a question of mathematics in finding bed rock level.

Miniature earthquakes created by dynamite are registered on this field seismograph used in determining the depth of bed rock. Circle—Here is the field receiving set where the subterranean disturbance is filmed. The detectors are on right.

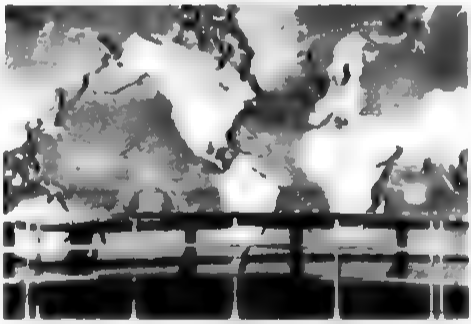
SOLID rock conducts sound at the rate of 16,000 to 20,000 feet per second. Sand, clay, and gravel conduct sound at rates which vary between 1,000 and 6,000 feet per second. Putting these two facts together, highway engineers have devised a seismic method of determining just what type of subsurface material they will encounter in laying roads and building bridges.

Should an engineer wish to determine how deep he will have to go to get to bed rock, he employs a new type of field seismograph, a portable unit recently perfected for shallow work.

At a selected point he buries a blasting cap or small charge of dynamite. Between this charge and the receiver there are placed in the ground three detectors spaced 50, 100 and 150 feet from the shot.

When the shot is discharged, the disturbance traveling through rock passes the slower moving disturbance in the soil. Each detector picks up both disturbances, recording them on film in the receiver. The difference in time between the soil and rock disturbances determines the soil depth.

Animated Map Visualizes Journeys



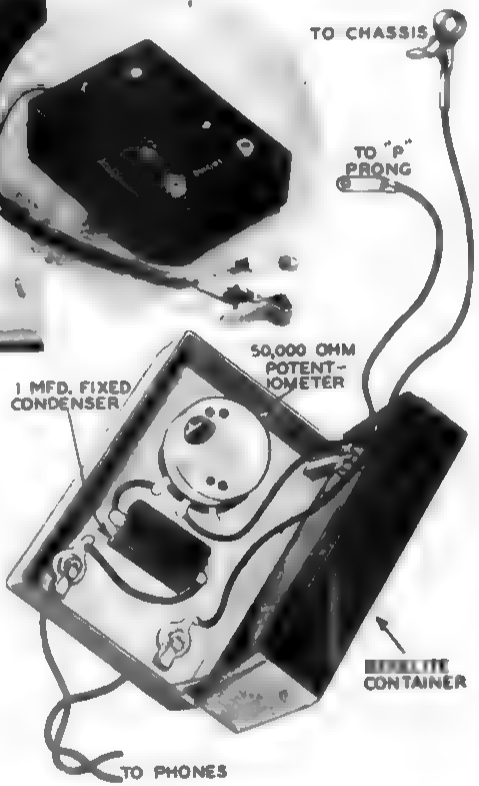
Push-button cruises of the entire world are made on this map. Tiny ships or trains follow the lines shown to the destination one has selected from the buttons on the rail.

STATIONARY travel—that is what takes place daily at the R. C. A. Building, New York City, where the Socony-Vacuum Oil Company has opened a permanent Industrial Exposition. While actually remaining in the mammoth hall, spectators may travel at will in miniature boats and trains over a map of the entire world.

In front of the map are a series of buttons representing steamship and railroad lines. On pressing one button, a tiny S. S. Normandie leaves New York for Havre, France. Other buttons dispatch boats or trains to any selected points on the map.

Headphone Adapter Aids Reception of DX Stations

Just pull out the last audio tube in your receiver, slip the connecting clip over its plate prong, and replace the tube to plug this compact headphone adapter in operation. Distant stations too far away to give loudspeaker volume can then be brought in on headphones. The clip attaches to radio chassis.



The potentiometer and condenser are connected in series with the headphones in manner shown in above pictorial diagram.

ATTACHABLE to any radio receiver, old or new, this compact little adapter unit allows headphones to be plugged in for clear reception of distant stations or to obtain greater volume on locals for those who are hard of hearing. A small bakelite cigarette box serves as container. Into the box are wired the necessary parts, a 50,000 ohm potentiometer, a .1 mfd. fixed condenser, and phone tip jacks.

To attach the adapter to a receiver, simply pull out the last audio tube and slip the prong connector clip over the plate prong. You can locate the correct prong by referring to any radio tube chart. Attach the clip-lead to any metal part of the receiver. Insert the phone tips into the adapter jacks, turn up the volume control of the set, and there is your radio program, coming through the phones. The loudspeaker may be disconnected if desired.

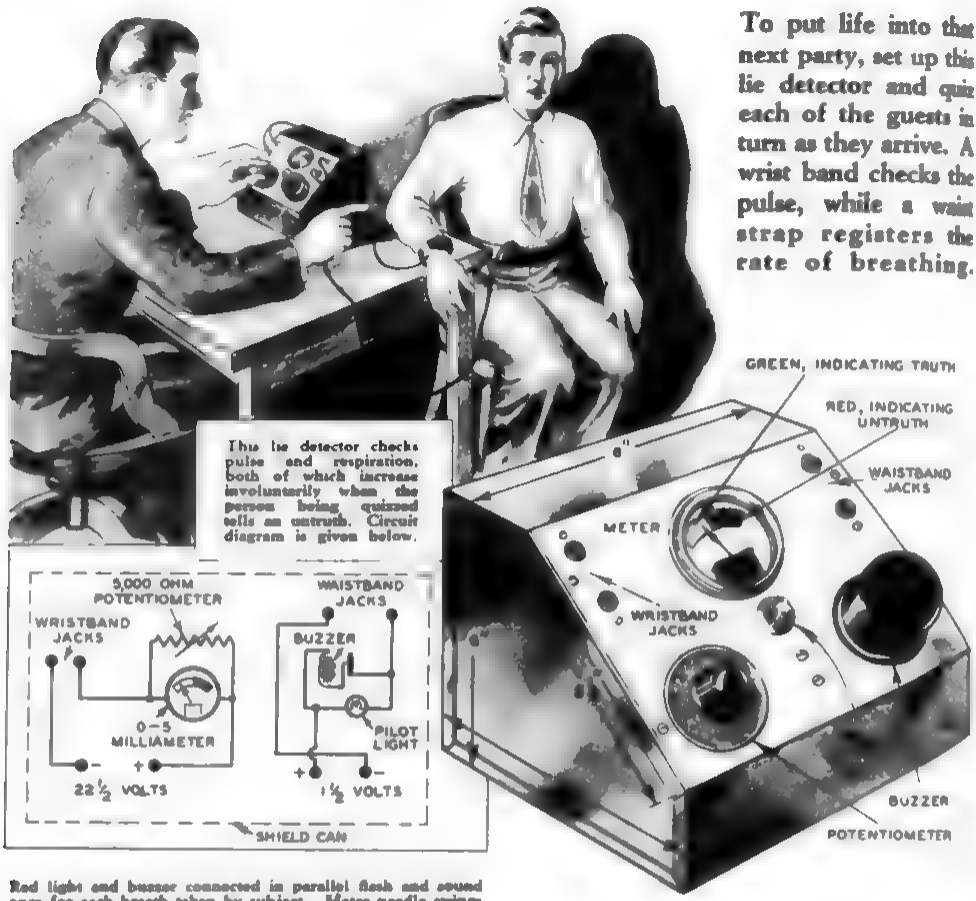
On receivers which have two output tubes try the adapter on one tube, then the other, selecting that which gives best results. On many sets the connector can be slipped over a grid prong with equally good results.

The completed adapter in its polished bakelite cabinet may be kept permanently on top of your radio receiver without detracting in any way from the appearance of the room.

Volume can be controlled by both the adapter and the regular receiver controls.

QUIZ PARTY GUESTS with

To put life into that next party, set up this lie detector and quiz each of the guests in turn as they arrive. A wrist band checks the pulse, while a waist strap registers the rate of breathing.



Red light and buzzer connected in parallel flash and sound once for each breath taken by subject. Meter needle swings over to red section of dial when pulse beat quickens.

ONE of the most talked about weapons science has been using in its fight against crime is the *lie detector*. While to many this device seems incredible in its operation, it is really quite a simple affair, and not at all hard to build at home from a few simple radio parts and batteries.

The detector described here, working on the same principle as the most complicated of police units, will prove an efficient laugh-producer for a party or carnival.

There are two separate electrical circuits in the unit, one for registering on a meter the strength and rate of the pulse, and the other for detecting changes in respiration.

A common doorbell pushbutton was found to be ideal for registering the breathing of the subject. Attach to the button a disc of bakelite about 1½" in diameter, using a small bolt. Cement a felt pad over this disc, then make the belt which goes around the waist and supports this momentary type switch.

Secure an inexpensive belt in as long a length as possible, adding extra eyelets to make the belt fit any person, large or small. About twelve inches from the buckle end of the belt mount the pushbutton, punching four holes and attaching with small brass bolts and washers. Connecting the pushbutton terminals to a flexible cord having phone tips at the opposite end completes the waistband.

A tiny microphone strapped tightly against the wrist is used to pick up the pulse beats. Secure a small, inexpensive carbon microphone and solder a small metal bar to micro-

Double-Action LIE DETECTOR

by THOMAS A. BLANCHARD

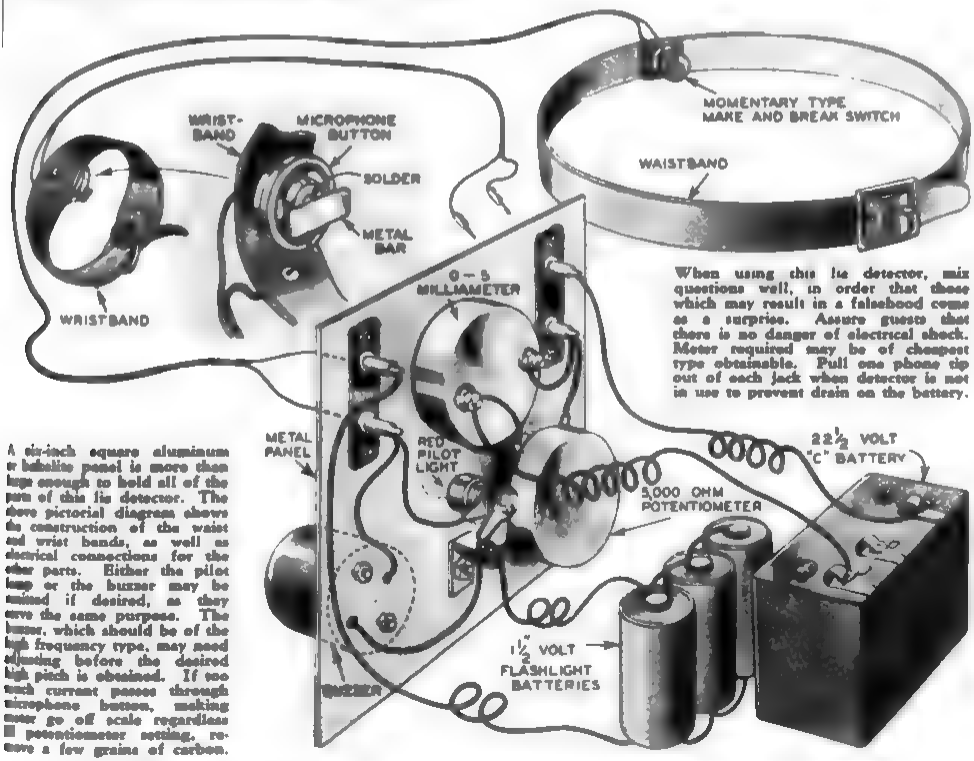
phone button. This button is mounted in a leather wrist band and connected to a second flexible cord having phone tips. In operation, the pulse beats pack the carbon grains closer together and change the resistance of the microphone.

A crackle finish metal cabinet with an aluminum panel is ideal for the indicating parts of this detector, but a large cigar box will give just as good results. There should be enough room on the panel for the 0-5 milliammeter, for a small red pilot light, for two pairs of phone jacks, for a buzzer, and for a potentiometer. Three flashlight cells connected in parallel supply power for the light and buzzer, these cells being placed inside the case. A 22½ volt battery operates the meter.

The 1½ volt pilot light and the buzzer are connected in parallel, to operate at the same time. Those at a party who cannot see the light will be able to hear the buzzer. The push button strapped around the waist closes the light-buzzer circuit each time a breath is taken, causing the buzzer to sound. The microphone button placed on the wrist is connected in series with the 0-5 milliammeter and a 22½ volt battery. Changes in pressure on the button with each pulse beat change the current flowing through the circuit, the meter needle registering these changes. The original meter calibrations are changed to a color chart with green on the left side, red on the right, and a strip of yellow in the exact center. The needle will swing over the green portion of the scale when the pulse is normal, but pass over into the red side when pulse is above normal, indicating an untruth.

To use the lie detector, first attach the wrist band so that the small metal plate is pressing against the pulse. Request that the hand be held in such a way that the button is in a vertical position. Strap the belt around the waist next, putting the pushbutton in front.

Now adjust the knob of the potentiometer until the meter needle swings over the green portion when the pulse is normal.



When using this lie detector, mix questions well, in order that those which may result in a falsehood come as a surprise. Assure guests that there is no danger of electrical shock. Meter required may be of cheapest type obtainable. Pull one phone tip out of each jack when detector is not in use to prevent drain on the battery.

A six-inch square aluminum or bakelite panel is more than large enough to hold all of the parts of this lie detector. The above pictorial diagram shows the construction of the waist and wrist bands, as well as electrical connections for the other parts. Either the pilot lamp or the buzzer may be omitted if desired, as they serve the same purpose. The buzzer, which should be of the high frequency type, may need adjusting before the desired high pitch is obtained. If too much current passes through microphone button, making meter go off scale regardless of potentiometer setting, remove a few grains of carbon.

For Travelers—A Vest-Pocket A. C. Radio

Compact arrangement of parts and an efficient dual-purpose tube permit construction of this all-electric radio set in small box shown.

EVER since radio's early days experimenters have been trying to develop a radio small enough to be carried in the pocket, yet sufficiently powerful to pick up distant stations with good headphone volume without requiring external batteries.

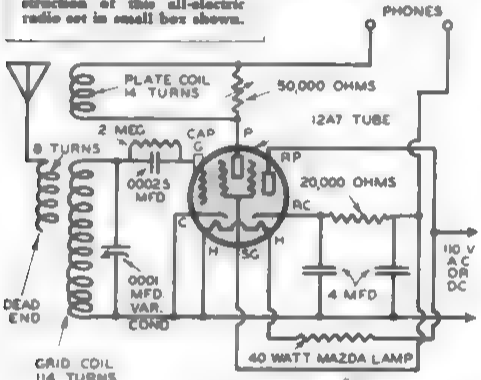
After some experimenting along the "pocket" receiver line, a little set, truly a pocket radio, was conceived and is presented here for the first time. The finished receiver not only has a long distance range, but it presents an appearance equal to a factory-made set, with no hard-to-get materials being employed in its construction.

The bakelite container in which the finished set is housed was originally the package used for a belt and suspender set available at one of the better men's furnishings establishments. After the contents had been removed the box was intended for candy or cigarettes, but was found to be just the thing for a radio.

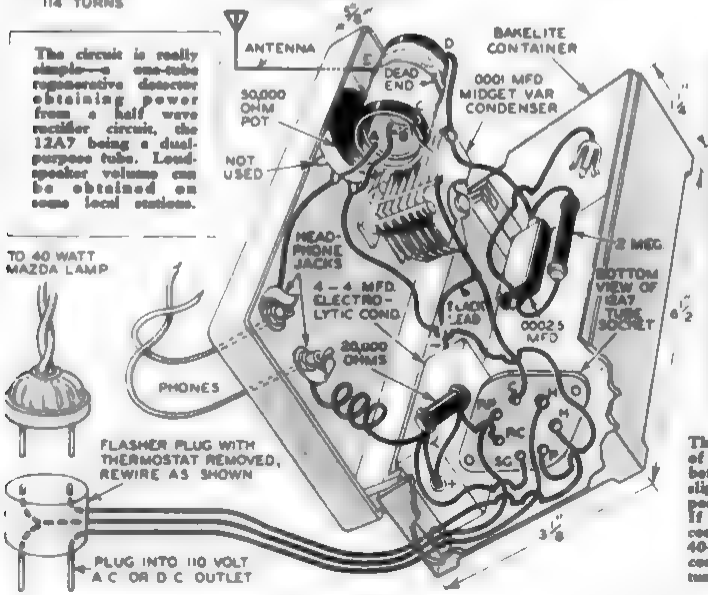
The completed set is ideal for travelers or for hospital use, since a tiny earphone is used instead of a speaker. The complete receiver weighs about one pound, and its unique container protects the contents from breakage.

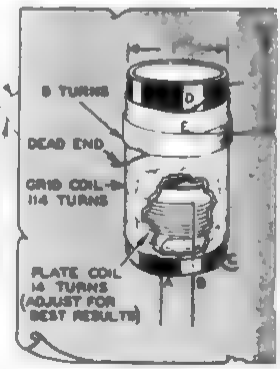
Examination of the circuit will show that only a few parts are required. The 12A7 tube is of the dual purpose type, one-half serving as the current rectifier and the other

[*Continued on page* 120]



The circuit is really simple—a one-tube regenerative detector obtaining power from a half wave rectifier circuit, the 12A7 being a dual-purpose tube. Loud-speaker volume can be obtained on some local stations.

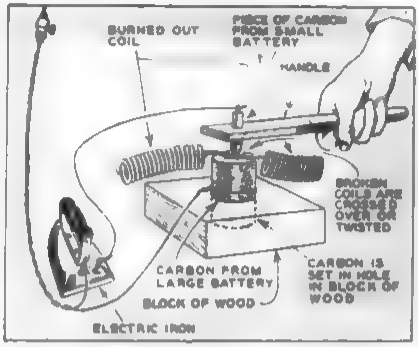




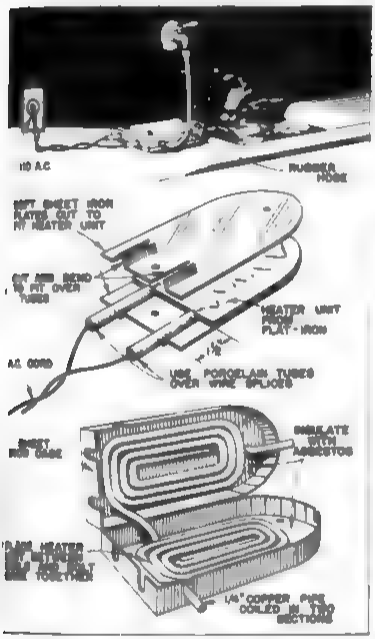
This pictorial diagram makes assembly of parts easy for those who have never before built a radio set. Grid clip slips over top cap of tube. Adjust position of plate coil for best results. If set fails to oscillate (squeal) reverse connections to the plate coil. The 40-watt lamp, reduces line voltage to correct value for the tube. Plate tuning dial on the condenser shaft.

A. C. Spot Welder Repairs Heater Coils

WHEN the heating coil of an electric stove or toaster burns out, a neat and permanent repair can be made in a few minutes by spot-welding the broken joint. Set into a block of wood a piece of carbon from a large dry cell. For the other welding electrode file to a point the carbon of a flashlight cell, and connect to a lead of flexible wire. Make connections to an a. c. source, placing an electric iron in series with one of the leads. Wires to be welded are placed between the carbon electrodes, and current kept on until the arc has fused the metals.—A. H. Waychoff.



Heat Water With Electric Iron Element

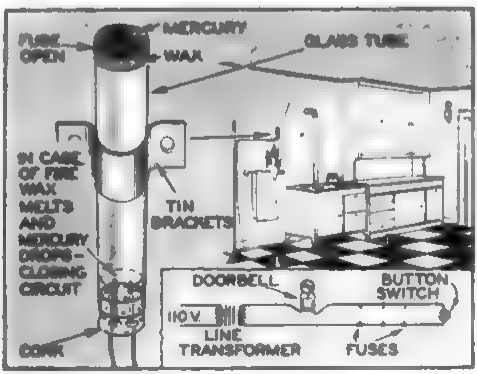


WATER can be heated just as it runs from the faucet with this simple heater, made from the element of an electric flatiron. Water runs through copper tubing coiled on both sides of the heater, the copper conducting heat rapidly from the wires to the water. Temperature of the water may be adjusted by changing the rate of flow of water through the unit.

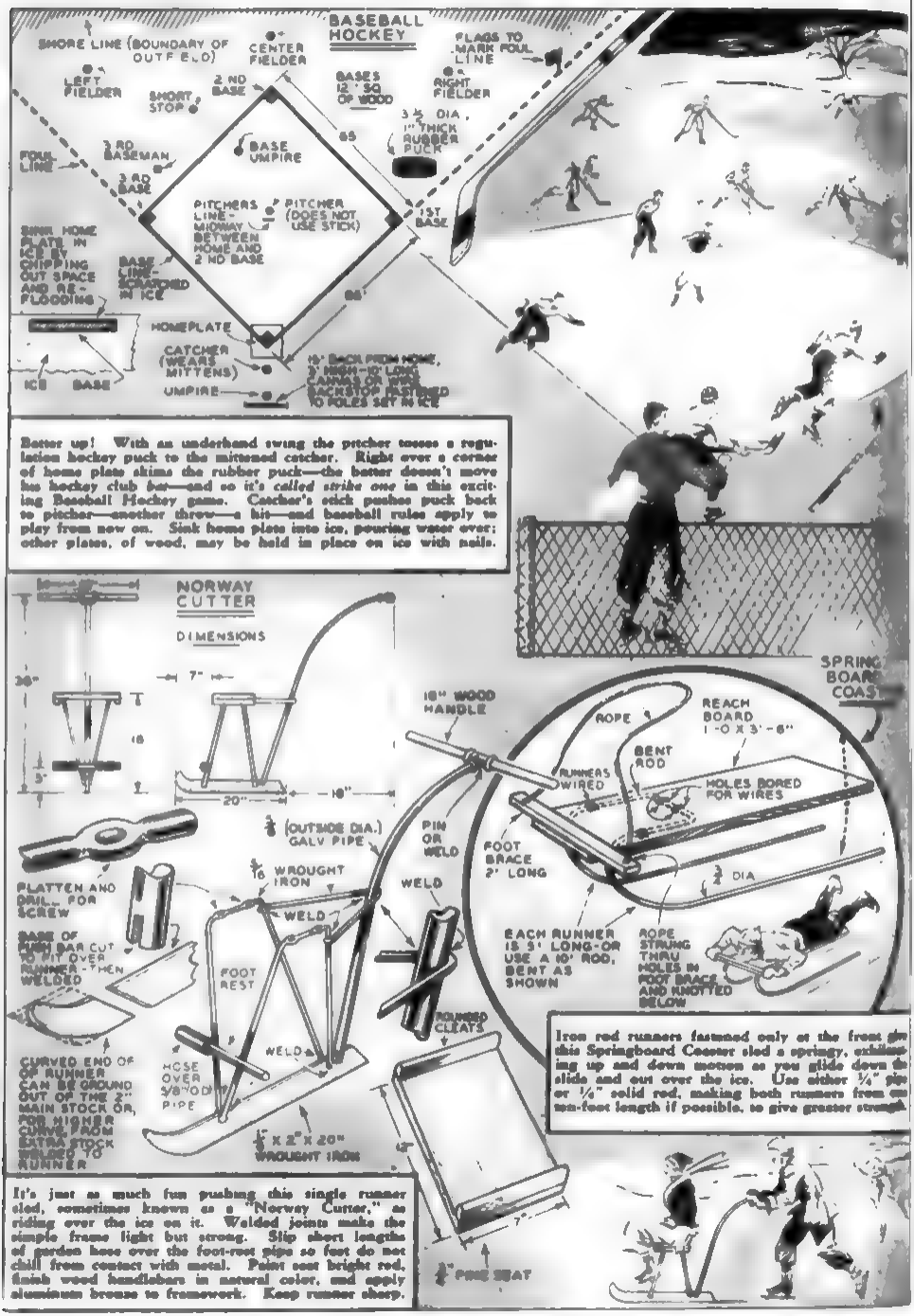
The housing for the unit is cut from soft sheet metal, to a size which will fit loosely over the selected heating element. Slits are cut out and the tabs bent to form the curved parts. Metal cover plates for the heating element are next cut, and slits made to provide room for the porcelain tubes through which electric wires enter. These plates are bolted together. A length of quarter-inch copper tubing is next bent into two coils which fold together and surround the heating element. Sheets of asbestos should be placed between the coils and the case, to prevent too great a loss of heat. The entire unit is now bolted together, and connections to the faucet made with a length of rubber hose. Do not turn on the heater until water is flowing through the tubing.—H. Hargett.

Doorbell Rings If Fire Starts

A FEW of these perfume vial fire alarms, mounted in parts of the house where fires are likely to start, may be connected into the doorbell circuit to ring the bell whenever room temperature is high enough to melt wax. Pour a little mercury into each vial, then a few drops of melted wax. Force two small nails or pins through each cork, and make connections from these to the doorbell button contacts.—T. A. Blanchard.



SLEDS and SCOOTERS for

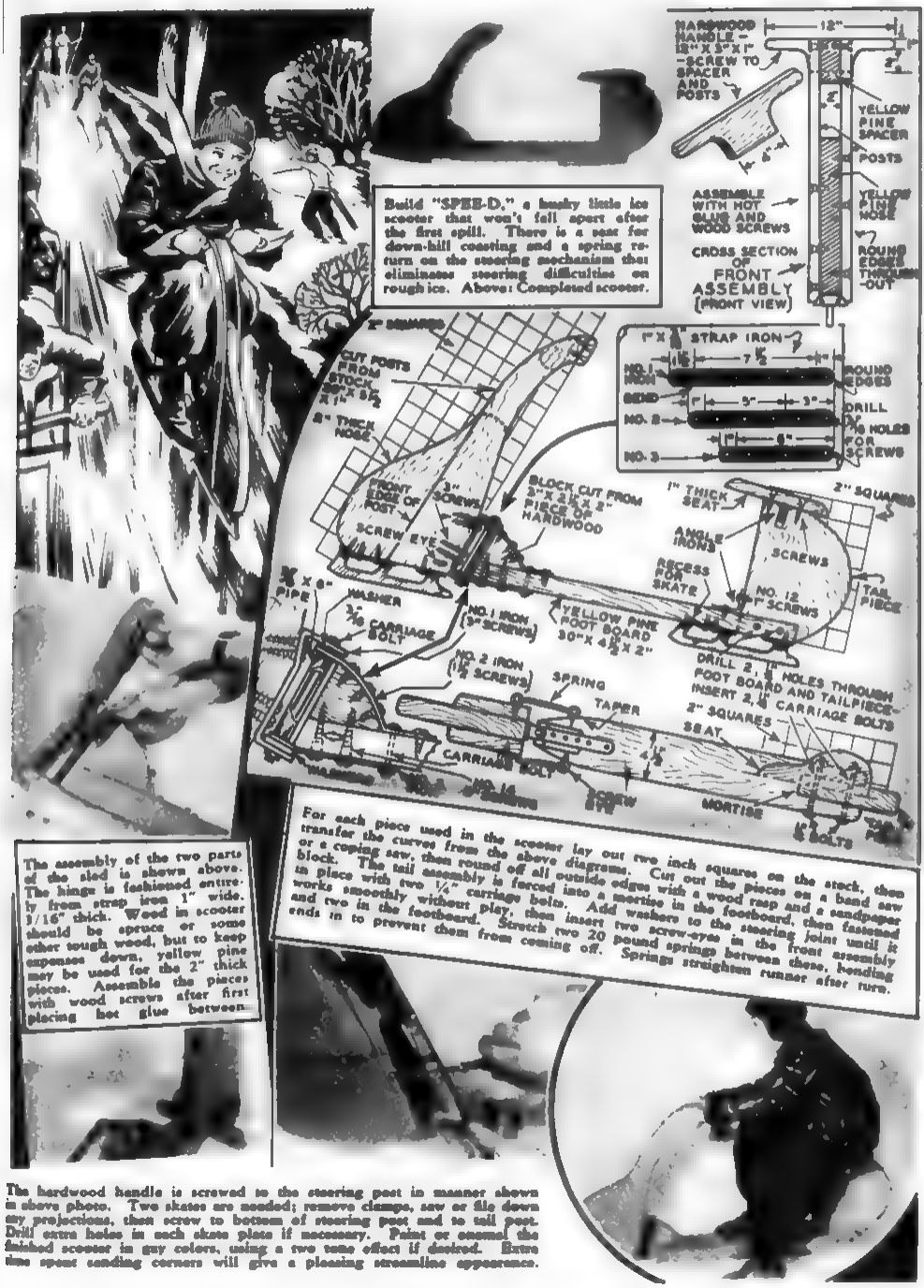


Batter up! With an underhand swing the pitcher tosses a regulation hockey puck to the mittened catcher. Right over a corner of home plate skims the rubber puck—the batter doesn't move his hockey club *bat*—and so it's *called strike one* in this exciting Baseball Hockey game. Catcher's stick pushes puck back to pitcher—another throw—a hit—and baseball rules apply to play from now on. Sink home plate into ice, pouring water over; other plates, of wood, may be held in place on ice with nails.

Iron rod runners fastened only at the front give this Springboard Coaster sled a springy, exhilarating up and down motion as you glide down the slide and out over the ice. Use either ¼" pipe or ¼" solid rod, making both runners from one ten-foot length if possible, to give greater strength.

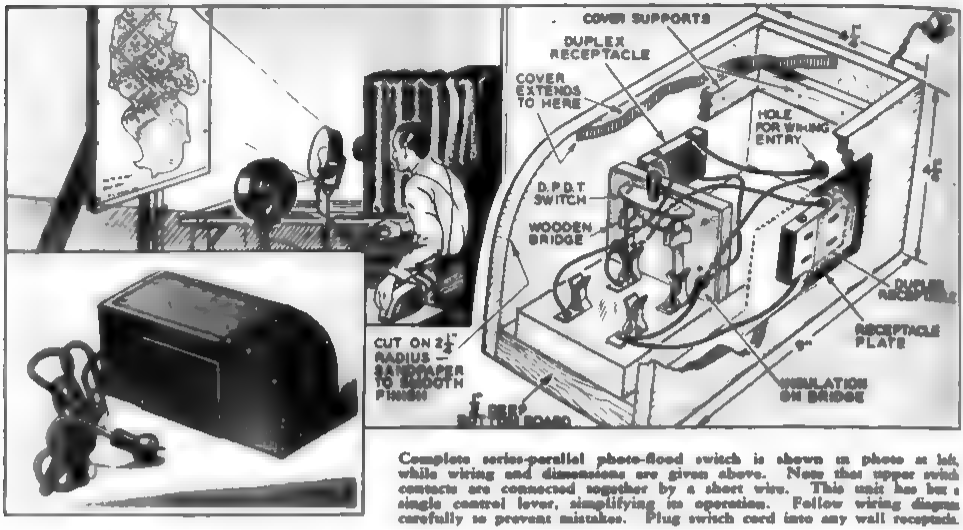
It's just as much fun pushing this single runner sled, sometimes known as a "Norway Cutter," as riding over the ice on it. Welded joints make the simple frame light but strong. Slip short lengths of garden hose over the foot-rest pipe so feet do not chill from contact with metal. Paint seat bright red, finish wood handlebars in natural color, and apply aluminum bronze to framework. Keep runner sharp.

NEW GAMES ON ICE



The hardwood handle is screwed to the steering post in manner shown in above photo. Two skates are needed; remove clamps, saw or file down any projections, then screw to bottom of steering post and to tail post. Drill extra holes in each skate plate if necessary. Paint or enamel the finished scooter in gay colors, using a two tone effect if desired. Extra time spent sanding corners will give a pleasing streamline appearance.

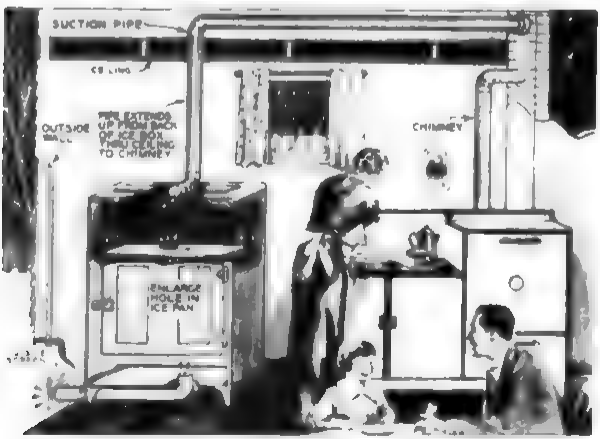
Series-Parallel Switch Prolongs Life of Photo-Flood Lamps



Complete series-parallel photo-flood switch is shown in photo at left, while wiring and dimensions are given above. Note that upper switch contacts are connected together by a short wire. This unit has but a single control lever, simplifying its operation. Follow wiring diagram carefully to prevent mistakes. Plug switch cord into any wall receptacle.

Use Icebox Without Ice In Winter

ANY icebox can be converted into a cold air refrigerator which may be operated throughout the winter months with no expense for ice or any additional attention. The chimney draft is ingeniously utilized to pull cold outdoor air through the icebox, ordinary stove pipe being used to make connections. All pipe joints must be soldered to make connections air-tight and secure a good draft. In summer the chimney pipe is closed off, but the inlet pipe is used as a drain, solving the vexing problem of an overflowing ice water pan.



Cold air replaces ice during winter months if icebox is converted as shown.

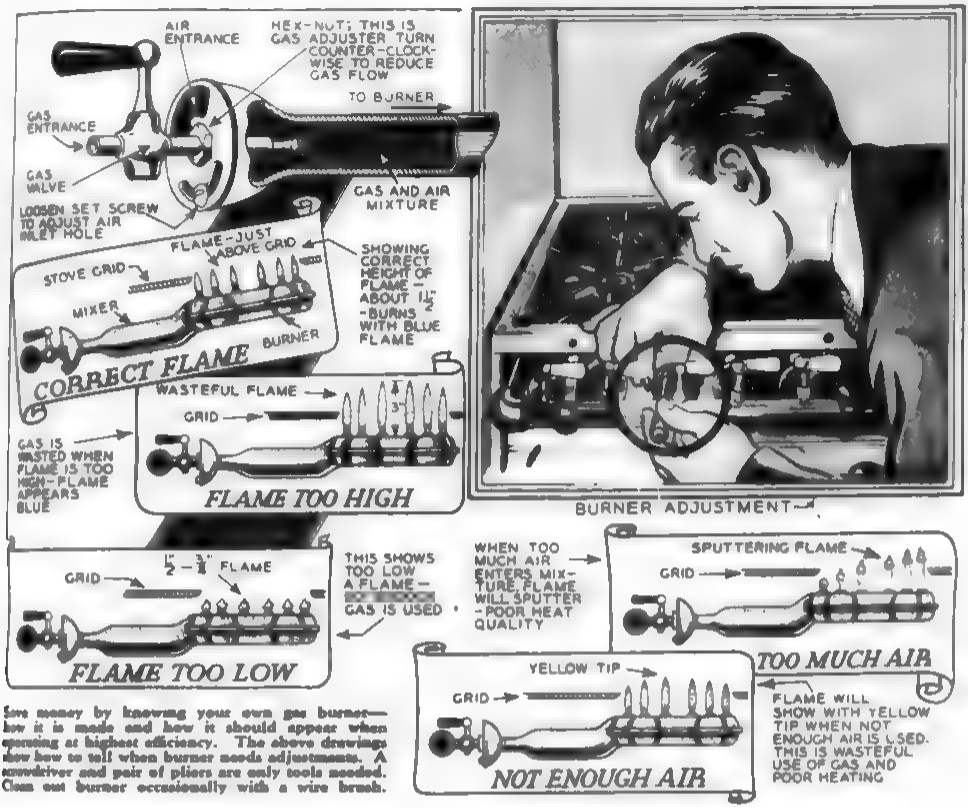
WHILE the photo-flood lamps used in indoor photography give off a powerful light, their rated life is but two hours. If, however, the bulbs are connected together in series while focusing and arranging the scene, and operated at full voltage only during the time the camera plate is exposed, up to two hundred pictures may be taken with one bulb.

With this series-parallel switch a single movement of the handle changes either two or four lamps over from the series to the parallel connection. Two duplex receptacles, a double pole double throw knife switch, about eight feet of wire, and a few scraps of lumber are needed, these costing less than one dollar if purchased.

Remove two of the switch contacts and remount on a piece of insulating material, such as a phonograph record, which is fastened to the vertical wood block. This insulation will prevent shocks if wood is damp.

Any reasonable number of lamps can be used with this switch, provided they are divided equally between the two receptacles. When the switch handle is in the up position, the two groups of lights will be in series, burning at half voltage; use this position for focusing. When ready to expose, throw the switch down.

How To Adjust A Gas Burner



Save money by knowing your own gas burner—how it is made and how it should appear when operating at highest efficiency. The above drawings show how to tell when burner needs adjustments. A screwdriver and pair of pliers are only tools needed. Clean out burner occasionally with a wire brush.

BLACKENED kettles and pans or extra minutes added to potato-boiling time mean that your gas burner is out of adjustment. The necessary changes are very simple, and can be made by anyone if a few simple rules are followed.

First we must know something about the gas burner itself. Study carefully the cutaway diagram at the top of this page, which shows a typical gas burner. The gas valve, controlled by hand, admits any desired amount of gas into the flared section of the burner. A hexagonal nut controls the size of the small opening through which gas passes after going through the valve.

Gas entering the mixing chamber through the opening creates a slight vacuum which pulls air into the chamber through the semi-circular openings. These air openings are adjustable by loosening a set screw.

To tell whether your gas burner needs adjusting, refer to the *Correct Flame* diagram. This flame is blue in color throughout, with darker blue edges, about 1½ inches in height, and burns without flaring or hissing. The tip of the flame should just touch the bottom of the kettle. It heats quickly, and does not leave soot on the kettle.

If your burners do not operate satisfactorily, loosen the set screw at the front with a screwdriver, then turn the burner on full and light the gas. If the flame is too high, too much gas is passing. Turn the hexagonal nut slowly to the left until the flame is about 1½ inches high. If the flame is too low, turn the nut in the opposite direction.

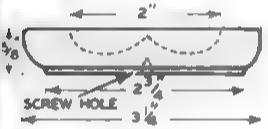
A sputtering flames indicates too much air; this is corrected by turning the air shutter slightly to admit less air. A yellow tip means that the burner is getting too little air. Adjust each burner in turn until the correct flame is obtained, then tighten the set screws.

These adjustments apply just as well to the water heater and to radiant heaters.

Turning PLASTER *of* PARIS

This shallow plaster of Paris plate, turned to perfect symmetry on an ordinary wood turning lathe, makes a beautiful dish for fruit. Dimensions are at right.

Photo at left shows plate mounted in lathe and nearly turned to shape. Note how the waste plaster is built up around the screw center face plate. Dimensions for the attractive little plaster ash tray are given below.



Plaster of Paris frames, tinted if desired, are ideal for small pictures clipped from magazines and for snapshots. No glass is needed; pictures are pasted to back of frame.

by **DALE R. VAN HORN**

THE ease with which you can cast and turn plaster of Paris pieces will surprise you. The soft material dulls the turning chisels no more quickly than wood, and instead of fine chips flying, the waste builds up like thick putty on the chisel tip.

When plaster of Paris plates and picture frames are made in a lathe, the face plate is removed and set in the plaster before it hardens. To make a plate, mix plaster enough to fill a ten-inch diameter mold half full, and pour it into the center. With some jiggling the plaster will flow out to the edges. The minimum edge thickness should be ½-inch or more, but with the center built up to 1½ inches deep. Set the small center screw face plate in the exact center, on top of the plaster, lining it up with a square and ruler. Now build plaster up around the face plate, to give added strength. The time lapse between casting and turning will depend somewhat upon the amount of water used. Roughly, follow this plan: Do not disturb the casting for at least 30 minutes after it has hardened. One or two hours will be even better.

Now break away the mold and lock the face plate in the lathe. Adjust your tool rest and start the lathe in low speed. First, turn off waste to remove wabble and off-center. Then turn to the desired dimensions, leaving the plaster around the face plate. This must not be cut off until plate has been completed.

After some spinning in the lathe, surplus water will begin to be thrown off from the edge, due to the centrifugal force of rotation, but this in no way weakens the plaster. If you have sharp chisels and use a steady grip, no sanding will be necessary and you'll be surprised at the smooth, velvety "feel" of the finished article.

NOVELTIES in a LATHE

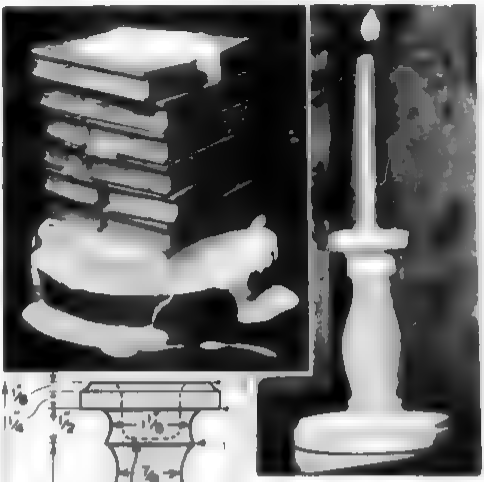
Finally, start cutting the plate free from the face plate with the cut-off or parting tool. When the diameter has been reduced to about one inch, stop the motor. You can now break the plate loose with a chisel, or continue slowly, turning the lathe by hand.

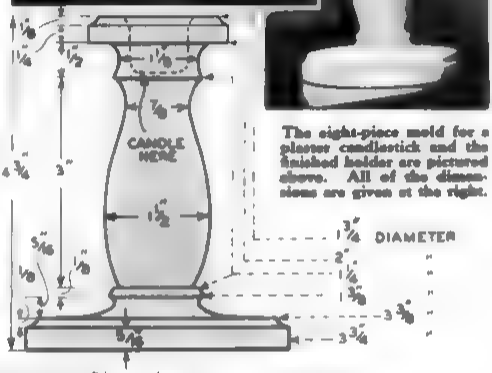
In making a picture frame, prepare a mold, pour the plaster, and set in the face plate as before. After the plaster has set, remove the mold and place the face plate in the lathe. Turn down the outer edges, then mark the diameter of the inside opening. Make a cut half way through from the back side, then make a corresponding cut from the front at low speed, until the rim drops off and the job is finished. This type of frame is ideal for unusual magazine clippings; the cutout picture can be glued directly to the back of the frame.

One of the best ways to cast articles like the candle stick is to build up the mold with a series of scrap wood blocks, each with a hole sawed out somewhat larger than the casting need be at that given height.

First cut a hole 4 inches in diameter from the bottom block, leading the saw in at the thinnest part, as shown. Next, cut 2-inch diameter holes in the 3 following blocks, and

[*Continued on page* 144]





The eight-piece mold for a plaster candlestick and the finished holder are pictured above. All of the dimensions are given at the right.

Plaster of Paris gives off water as it hardens, making it necessary to use wood molds which can expand or which are strong enough to withstand the swelling crisis of the water which is absorbed.

A plaster nut bowl with colored inlay rings is made in much the same manner as the other projects. After the bowl is turned to shape, inlay grooves are cut and filled with tinted plaster.

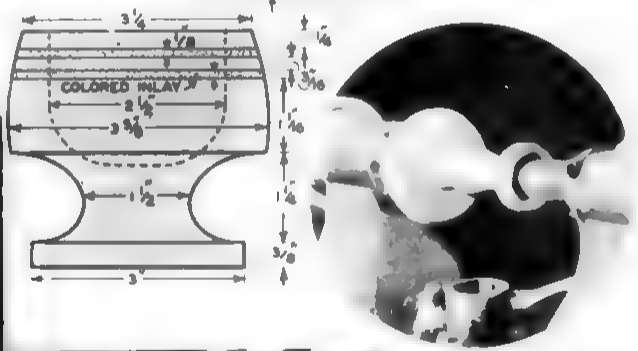


Photo in circle shows candlestick set up between spur center and tail stock in lathe. Note how tail stock fits into a wood dowel which had been imbedded into the plaster. Chisels should be just as sharp as for wood turning work. Turn candlestick down to the given dimensions, then smooth off any irregularities, remove from lathe, and apply a coat of clear shellac or lacquer to prevent dirt marks from showing. Plaster is best turned within one day after pouring; harder plaster chips off, forms an annoying dust.

FOR THAT OFFICE-AT-HOME

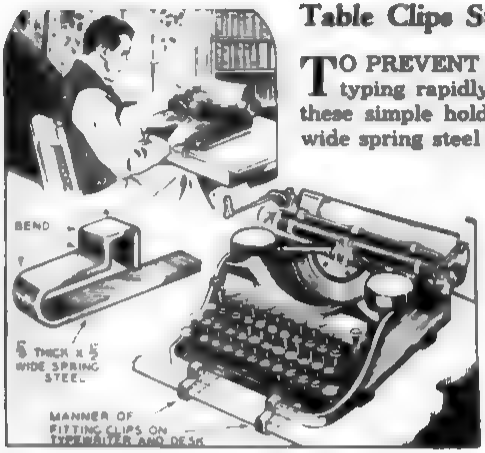
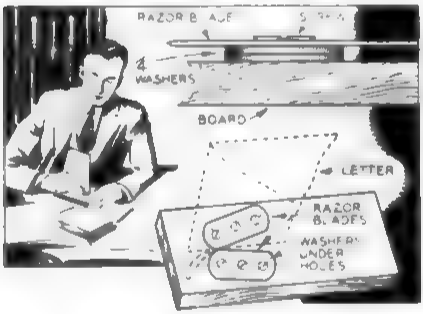


Table Clips Stop Creeping of Portable Typewriter

TO PREVENT portable typewriters from moving about when typing rapidly or pushing the carriage return, use a pair of these simple hold-down clips. To make the clamps, half-inch wide spring steel is bent in a vise to fit snugly over the front of the typewriter frame, then bent downward and back to fit tightly over whatever table is commonly used for typing at home. It is advisable to glue felt to the inside of each clamp, especially when they are used on varnished furniture. These clamps give rigidity and solidness to a portable.—A. H. Tempe.

Ice Speeds Moistening of Stamps, Envelopes

A SMALL piece of ice in a saucer will be found ideal for moistening envelope flaps, stamps, or even gummed tape. There is always just enough of a film of water over the ice.—Hi Sibley.

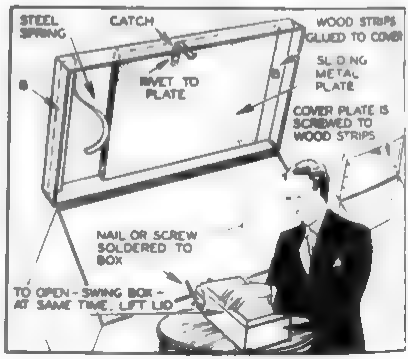


Letter Opener Made With Razor Blades

TWO razor blades mounted on a block of varnished hardwood make a handy little letter opener for the study. Pulling a letter between the twin blades removes a thin slice from either the top or the end of the letter, allowing a dozen letters to be opened in the time usually required for one. Mount each blade with small screws, placing two washers between the blade and the wood, to raise the blade about one-sixteenth inch. The blades should overlap at one end.—W. H. Ames.

Midget Office Safe Has Secret Lock

IDEAL for documents and letters which, though important, are used so often they cannot be placed in deposit boxes, this midget safe can be opened only by those knowing the secret of the simple but ingenious lock. The box itself, with its hinged cover, may be constructed from either metal or wood, but an ordinary fishing tackle box will be preferred by many. The secret catch is built into the cover, and consists of a sliding metal plate so mounted that it will open the box only if the entire unit is swung sharply to one side as the cover is lifted.—W. Kay.



CLEAN YOUR TYPEWRITER AT HOME

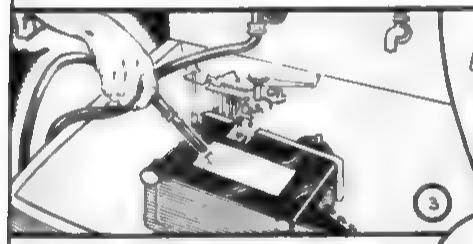
A SCREWDRIVER is the only tool required when cleaning typewriters by this safe and convenient method. The cleaning solution used is quite inexpensive and easily prepared.

In a wash tub or laundry tub prepare a solution made up of two ounces of trisodium phosphate to ten gallons of luke-warm water. Oakite, used by garages for cleaning auto motors, may be substituted for the trisodium phosphate, but the latter may be purchased at any drug store.

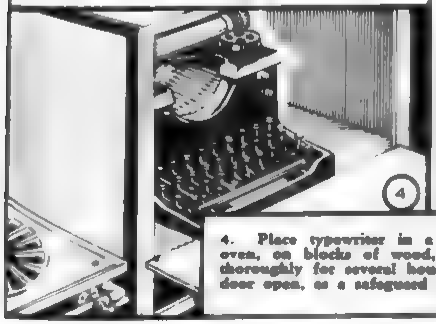
Follow the step-by-step instructions given with the diagrams on this page. Do not immerse the typewriter keys in the solution, for the key papers might become discolored.

There is no need to remove the rubber roller or any other parts of your typewriter except the cover plates. These plates are removed only to simplify the flushing-out process.

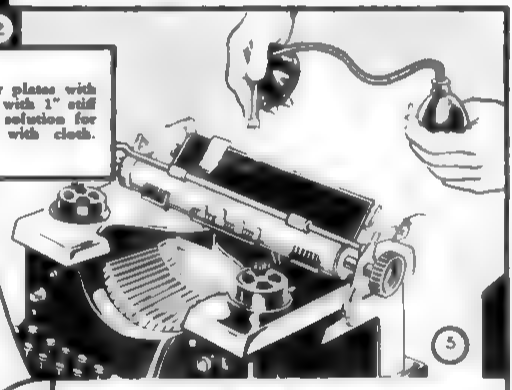
1. Remove ribbon. Remove top, front, and side cover plates with screwdriver. Brush out as much eraser dust as possible with 1" stiff bristle paint brush. 2. Immerse typewriter in cleaning solution for two hours. Do not soak keys. Wash key levers with cloth.



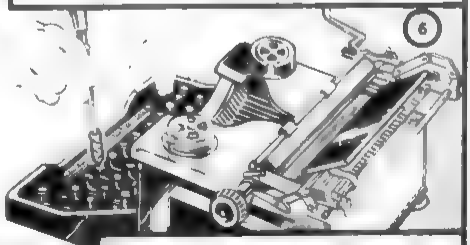
3. Place machine in sink, and wash out all loosened sediment as well as cleaning solution with stream of hot water from hose attached to faucet. Direct water into back of machine, to flush dirt away from complicated escapement mechanism. Continue for at least five minutes. Water will not harm roller, but cleaning solution, if too hot, may loosen gold-enamel trimmings on frame and damage rubber.



4. Place typewriter in a moderately heated oven, on blocks of wood, and allow to dry thoroughly for several hours. Keep the oven door open, as a safeguard against overheating.

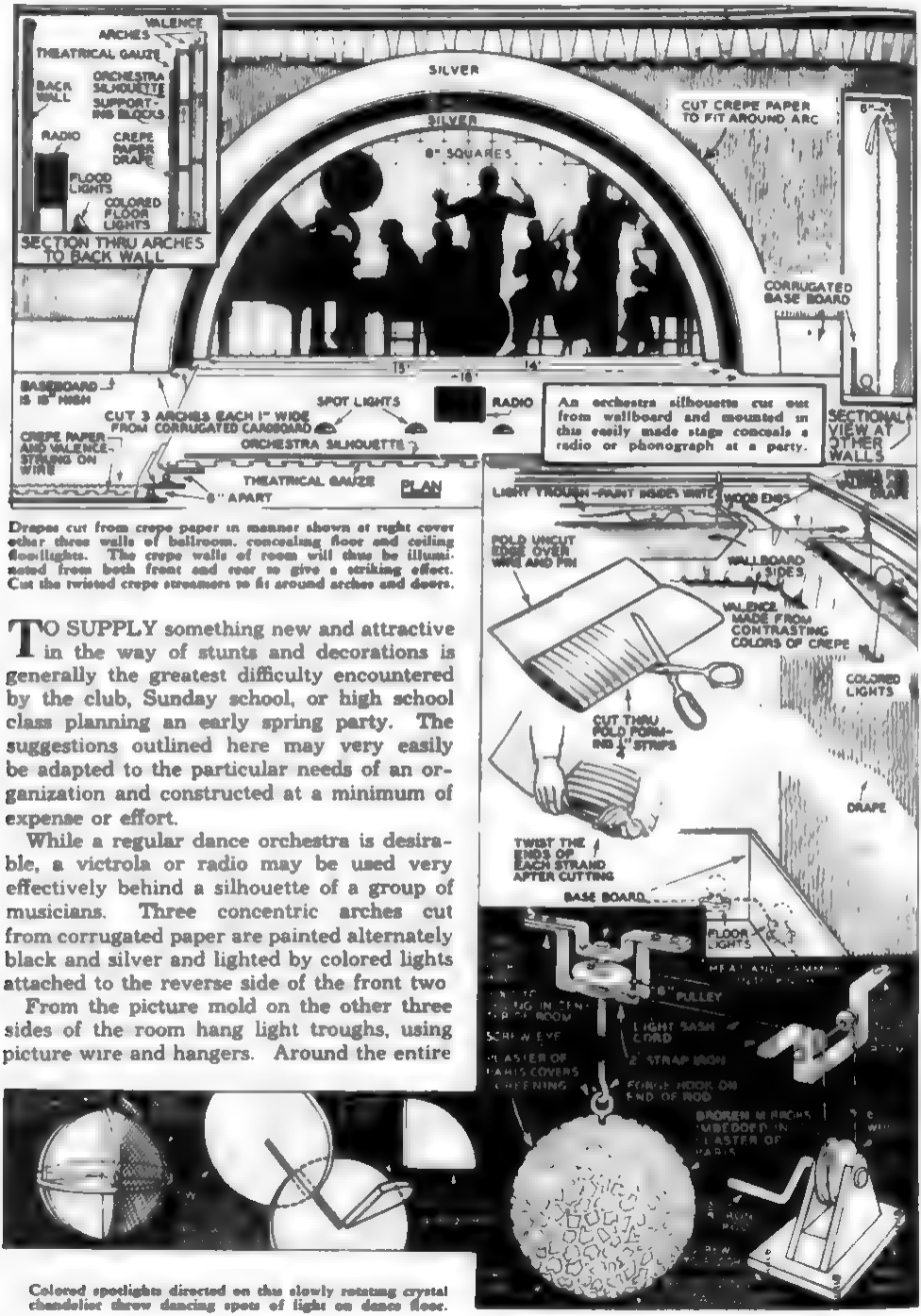


5. While machine is still warm after removing from oven, spray all moving parts with a half-and-half solution of typewriter oil (or a fine oil of equal quality) and kerosene. This is best applied with either a nasal oil spray or a small hand sprayer. If any keys tend to stick, hold down spacer bar and move key arm until free.



6. Scrape out dirt on key tops with cloth wrapped around point of ice pick and dipped either in carbon tetrachloride or commercial cleaning fluid. Type may be cleaned with same solution if necessary. Rub frame of machine with any good furniture polish.

STUNTS and DECORATIONS



Drapes cut from crepe paper in manner shown at right cover other three walls of ballroom, concealing floor and ceiling floodlights. The crepe walls of room will thus be illuminated from both front and rear to give a striking effect. Cut the twisted crepe streamers to fit around arches and doors.

TO SUPPLY something new and attractive in the way of stunts and decorations is generally the greatest difficulty encountered by the club, Sunday school, or high school class planning an early spring party. The suggestions outlined here may very easily be adapted to the particular needs of an organization and constructed at a minimum of expense or effort.

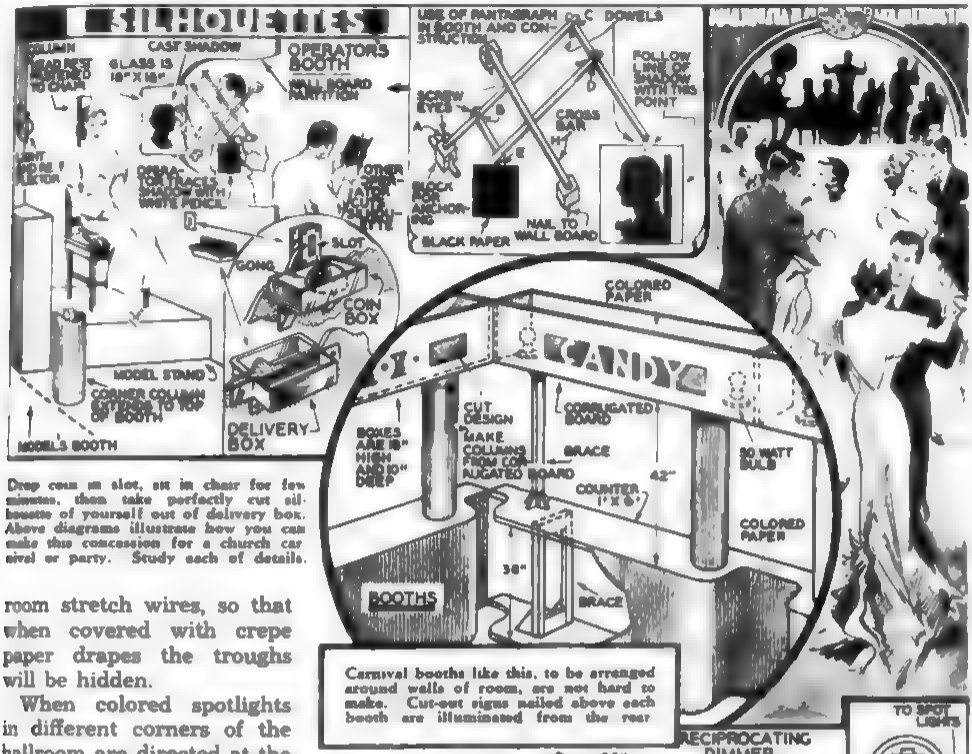
While a regular dance orchestra is desirable, a victrola or radio may be used very effectively behind a silhouette of a group of musicians. Three concentric arches cut from corrugated paper are painted alternately black and silver and lighted by colored lights attached to the reverse side of the front two

From the picture mold on the other three sides of the room hang light troughs, using picture wire and hangers. Around the entire

Colored spotlights directed on this slowly rotating crystal chandelier threw dancing spots of light on dance floor.

for SCHOOL CARNIVALS

by DAVID A. BROWN



Drop coin in slot, sit in chair for few minutes, then take perfectly cut silhouette of yourself out of delivery box. Above diagrams illustrate how you can make this concession for a church carnival or party. Study each of details.

Carnival booths like this, to be arranged around walls of room, are not hard to make. Cut-out signs nailed above each booth are illuminated from the rear

Two 5-gallon earthenware jars filled with a saturated salt solution pass electricity in proportion to space between fixed and movable electrodes to control lighting circuits. Connect just as you would switches, placing one dimmer in the main light circuit, the other in the spotlight circuit.

room stretch wires, so that when covered with crepe paper drapes the troughs will be hidden.

When colored spotlights in different corners of the ballroom are directed at the revolving crystal globe suspended from the center of the ceiling, and the main lights dimmed, the effect is that of myriads of colored lights dancing on the walls and over the heads of the dancers. The ball should be turned slowly by hand, or may be operated by an electric motor geared down. Light sash cord may be used for the belt.

When the house lights and the spotlights are operated with the reciprocating dimmer, one circuit may be brought up while the other is being dimmed. The lights may be set at any desired intensity by tightening the thumbscrew on the cross arm. When the cross arm is moved the circuit on the side rising will be dimmed and go out as the copper plate leaves the solution, while the circuit on the other side will be brought up simultaneously. Introduce one unit in the main light circuit, and the other unit in the circuit to which the spotlights are attached.

The booths for the sale of candy, pop corn, soft drinks and such things are made in units to be placed around a room. After bracing the counter cover the front with corrugated board, fluted side out, and paint to match decorations. By changing the wording in the sign and the color scheme these booths may be used year after year and for all type parties and lawn socials.

A good money maker is a silhouette cutting concession. The scheme given here may be used by anyone as no especial talent is required. Make the front of the booth similar

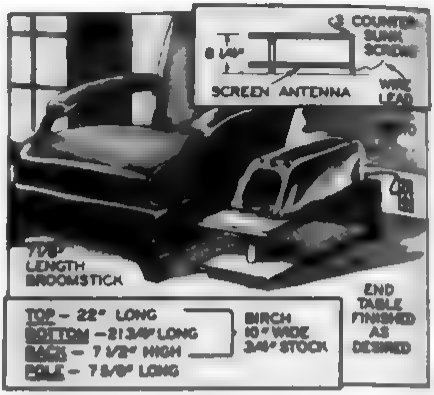
[*Continued on page* 126]

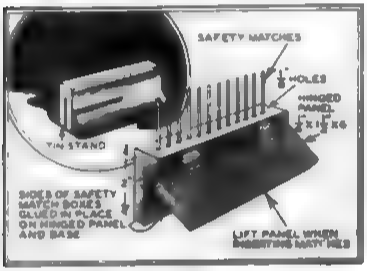
TWO-HOUR PROJECTS

Modernistic End Table Is 8" High

DESIGNED especially for use with a very low modern chair in an apartment, this ultra-simple end table will be found ideal for use with portable radios having tuning controls at the top rather than the front.

Choose clear birch for three boards, unless you happen to have pieces of hardwood on hand. Cut to shape, sand carefully, then assemble with wood screws and fit in place the broomstick which supports both upper and lower shelves at the front end. A piece of copper screen tacked to the under side of the bottom shelf may be used as aerial for the radio set, if no outside aerial is available.—R. E. Williams





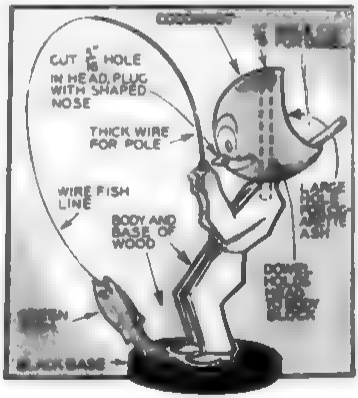
Matches Light When Jerked from Novel Rack

SAFETY matches placed in this rack light automatically when removed. Cut out the two blocks, hinge together, then adjust the spacing between so that, after scratching surfaces from match boxes have been glued in place, there will be just enough friction to ignite the match head. Jerk matches out sharply, to prevent the others from igniting. This rack can be combined with an ash tray or pipe holder if desired.—H. A. Way.

Comical Fisherman Catches Cigarette Ashes

A SMALL cocoanut, polished smooth with a wire-brush, forms the head of this ash tray fisherman. A large hole is sliced out with a coping saw, the meat removed, and smaller holes drilled for the supporting dowel and the nose. The body of the man is carved either with a pocket knife or coping saw. The fish may be carved or molded from plastic wood. The waves covering the base are molded with plastic wood, then painted blue.

The fish rod may be cut from bamboo, or formed by grinding steel wire to the desired taper. Paint in bright enamel colors after inking in facial features.—L. Graves.

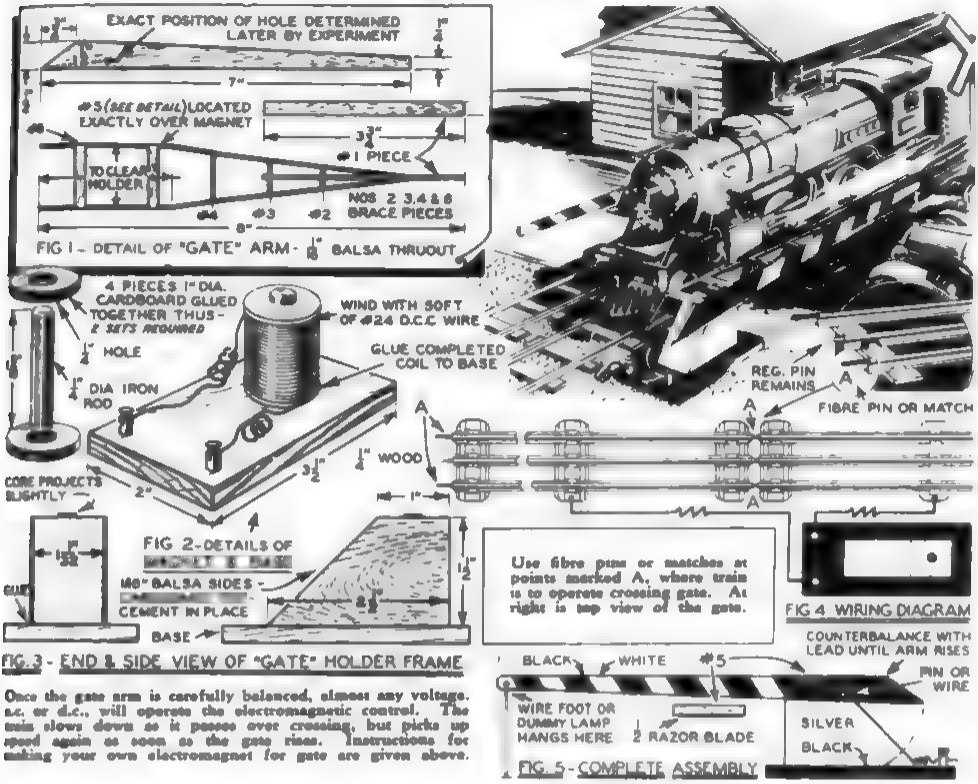


Print Your Own Letterheads With Woodcuts

DISTINCTIVE business or personal letterheads can be printed accurately and neatly with homemade woodcuts made with a razor blade.

A printing frame made from stiff cardboard insures that every sheet will be alike. Get a rubber roller for rolling out printer's ink on a stone or glass slab, as an ordinary stamp pad will not work here.—G. E. Van Horn.

Automatic Crossing Gates Lower As Model Train Passes



Once the gate arm is carefully balanced, almost any voltage, a.c. or d.c., will operate the electromagnetic control. The train slows down as it passes over crossing, but picks up speed again as soon as the gate rises. Instructions for making your own electromagnet for gate are given above.

THESE model railway crossing gates automatically lower while your train is passing over the grade crossing, the train speed being lowered while the gates are down. Each arm is carefully counterbalanced to permit control by a small electromagnet set into the base just under a section of razor blade which is glued to the gate arm. (Fig. 5.)

Make as many crossing gate arms as you require for your railway system; secure one coil from an old doorbell or buzzer for each. You may wind coils yourself if you prefer.

Connections between the track and the coil are made as indicated, the section of track before and after the crossing being insulated in such a way that current drawn by the approaching train must go through the magnet coil. Now adjust the counterbalance weights so that each arm will normally be upright, but will lower when the current is sent through the coil. It may be necessary to adjust the position of the razor blade and the magnet a bit to make the gate lower when a train passes over insulated section of track.

Make Tiny Trowel for Plastic Wood

A VERY handy tool for applying plastic wood in model or furniture building work can be made from an old spoon. Cut or grind down the sides of the spoon to form a triangular trowel blade, then flatten out and polish the working surface. This makes a handy tool for applying putty in tight corners, or for making model parts from plastic wood.

Cut teaspoon along dotted lines with hacksaw to make trowel

SKATE SAILING is

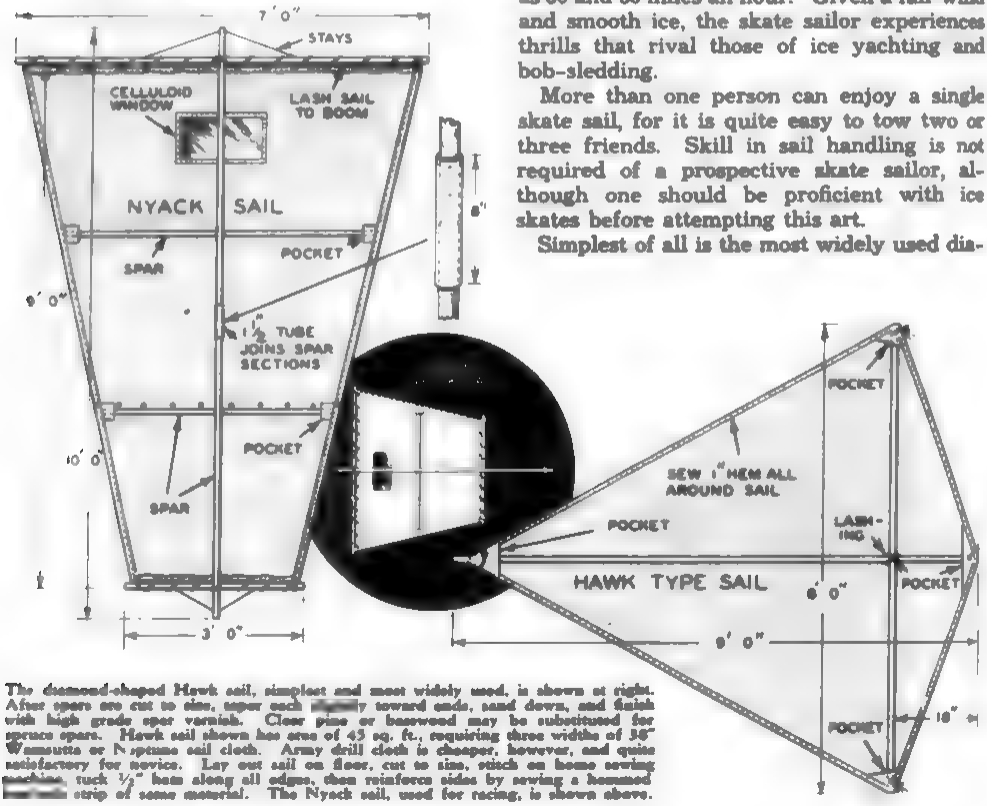
by JULIUS J. FANTA

Skate sail races can be held on any average size lake; if contestants wear skies instead of skates, cross-country races may be staged. Lean against the wind at all times, keeping the feet close together. If sail is on left side, keep left foot forward in manner shown. To stop, swing sail up.

SKATE sailing is the fastest sport in the world for the smallest outlay. A sail enables one to "wing" along at speeds as high as 50 and 60 miles an hour. Given a fair wind and smooth ice, the skate sailor experiences thrills that rival those of ice yachting and bob-sledding.

More than one person can enjoy a single skate sail, for it is quite easy to tow two or three friends. Skill in sail handling is not required of a prospective skate sailor, although one should be proficient with ice skates before attempting this art.

Simplest of all is the most widely used dia-



The diamond-shaped Hawk sail, simplest and most widely used, is shown at right. After spars are cut to size, taper each slightly toward ends, sand down, and finish with high grade spar varnish. Clear pine or basswood may be substituted for spruce spars. Hawk sail shown has area of 45 sq. ft., requiring three widths of 36" Wamsutta or Neptune sail cloth. Army drill cloth is cheaper, however, and quite satisfactory for novice. Lay out sail on floor, cut to size, stitch on home sewing machine, tuck ½" hem along all edges, then reinforce sides by sewing a hemmed strip of some material. The Nyack sail, used for racing, is shown above.

a Mile-a-Minute Ice SPORT

Hopatcong sails, used for racing in average winds, are seen in action in the above photo. Note that the sail is always between the wind and the skater, where it can be held easily with one hand. Stitch to your sail a gay red turkey cloth insignia or banners which can be identified at a distance.

mond-shaped sail, fashioned like a huge kite and known as the Hawk type. The most durable spars for this are made from clear aeroplane spruce 1½" in diameter. For convenience in carrying when not in use, both the mast and boom may be cut in two and joined with an 8" long chrome plated brass tube or ferrule.

Half of the fascination of skate sailing is experimenting with various types of sail, to find which is the most suitable in winds of varying forces. The 37 square foot Cape Vincent sail is designed especially for heavy winds. It is extremely fast for its area and very easy to learn to handle.

The Cape Vincent boom is 9 feet long and functions like an arrow as it fits into a slight notch of a 1" rattan bow to hold the bow in shape. The cord of the 8" arc is eight feet long, making the sail that wide. The bow is slipped into a two-inch sewed sleeve and is fastened at the ends to grommets at the vertices of the sail. Handles for grasping the sail when luffing are located one foot from the boom. Windows or ports are not strictly necessary, but they are advisable for safety.

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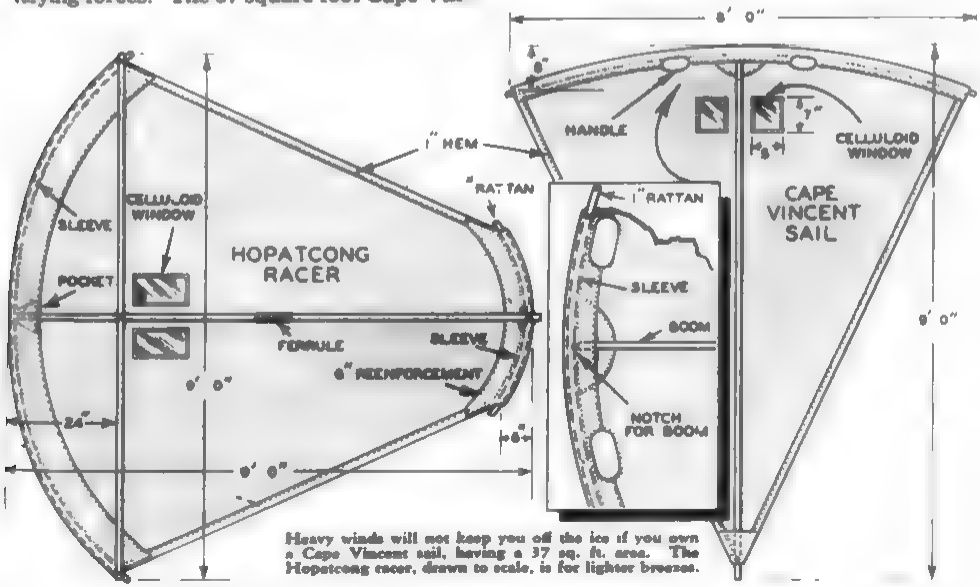
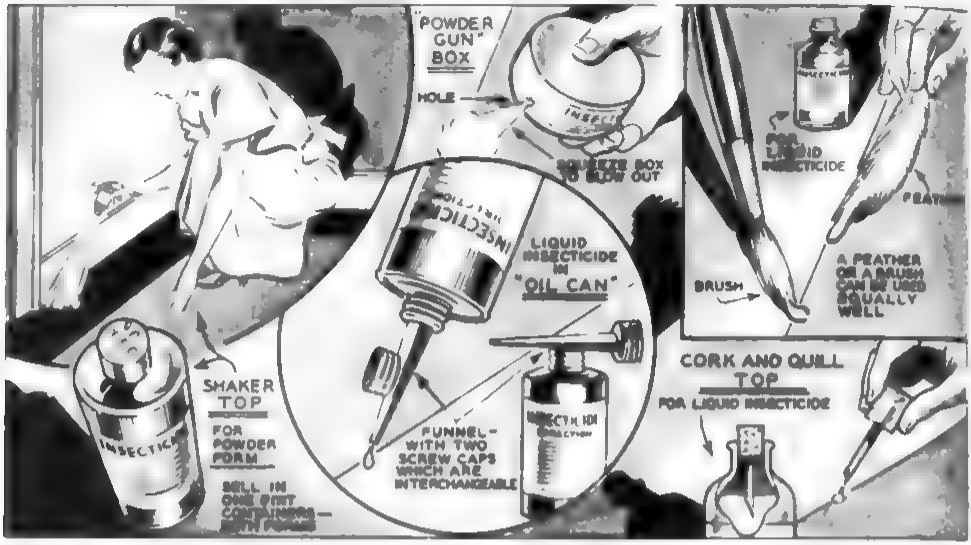


Heavy winds will not keep you off the ice if you own a Cape Vincent sail, having a 37 sq. ft. area. The Hopatcong racer, drawn to scale, is for lighter breezes.

NINE Profitable FORMULAS



by DON BENN OWENS, Jr.

MEN or women out of employment, or having spare time in evenings, can make their own jobs with chemicals—*if they know how!* Certain products can always be sold if the price is kept down, and the home manufacturer, having no overhead or office expenses, can keep his prices down.

Cleaning compounds, insect destroyers, automobile necessities, and plating powders are good sellers the year around, and can be made cheaply in any kitchen without expensive machinery or high initial investment.

1. ONE-SHOT INSECTICIDE

Naphthalin	5 ounces
Gasoline	40 ounces
Carbon tetrachloride	40 ounces

Simply mix and dissolve. Formula can be improved by adding five ounces of resin or paraffin, which will form a coating over eggs of insects and prevent their hatching out. State on label that this compound is NOT inflammable, is highly recommended for flies, mosquitoes, roaches, bedbugs, fleas, and other insects, and that it can be used freely on bedding, furniture, wallpaper, upholstery, or textiles. Pack in one pint, round, screw cap bottles to retail for 15 cents. No manufacturing license is needed. Cafes and hotels usually buy in gallon lots—there is still a handsome profit at a selling price of $2.50 per gallon.

2. GOLD PLATING POWDER

Gold chloride	90 grains
Potassium cyanide	280 grains
Potassium bitartrate	24 grains
Prepared chalk	1 avoirdupois ounce

Mix the ingredients thoroughly and pack in large drug envelopes which can sell for as high as 25 cents. Have these instructions for use printed on envelope: "Clean surfaces to be plated to remove all grit, dirt, or grease. Add water to powder to make moderately thick paste, then apply to surface with a piece of flannel, and rub until desired thickness of gold plate is obtained." Worn auto parts, watch cases, rings, or metal ware can be given a hard and substantial coating of gold.

Insect exterminator in powder form may be put up in shaker top cans and sprinkled into suspicious cracks, or in a powder gun box like that shown at top center. Liquid insecticides may be sold in the two-cap type of can, in a bottle having a quill type cork, or in a plain bottle containing instructions for applying with either a brush or a feather. Liquid exterminators are best applied, however, with a small hand sprayer.

● ● ●

3. SILVER PLATING POWDER

Silver chloride	3 drams
Sodium chloride (table salt)	3 drams
Prepared chalk	2 drams
Potassium carbonate	6 drams

Grind ingredients to powder, then mix well. To use, dip moistened rag in powder, then apply to article which is to be silvered, that having previously been cleaned. In packing powder in drug envelopes, be SURE to place it first in paraffin paper or Cellophane. Exposure to air for any length of time will change the powder into a liquid.

4. MAGIC POLISHING CLOTH

Castile soap	2 pounds
Jewelers' rouge	1 pound
Water	20 pounds

Dissolve the soap in water by first heating water, then add the rouge. In this solution soak pieces of woolen cloth about eighteen inches square, which may be red. Chamois skin may be used instead, to give a more durable cloth, but is considerably more expensive. Pack the cloths in large envelopes having directions for use, and sell for ten cents each. These cloths are fine for polishing silverware, glassware, furniture and metal fixtures on cars.

5. INK REMOVER

Chlorinated lime	4 avoirdupois ounces
Distilled water	32 fluid ounces

Thoroughly pulverize the chlorinated lime, then add the

for the KITCHEN CHEMIST

These nine easy-to-make products are gold mines for the man who wants to start a business of his own. Suggested packaging and bottling methods are illustrated above, while the formulas themselves are given below and on opposite page. Remember that attractive labels printed in a bright color or in two colors are your cheapest sales aid. In gross quantities, small bottles can be purchased for about one cent each. Local druggist can supply you bottles and containers to test selling power.

water and set aside for 24 hours. Strain through a cotton cloth, then add two fluid ounces of acetic acid to every pint of the solution. Put up in glass containers, not metal. To remove ink from paper, reverse penholder (or stick of wood) and dip into solution, then apply without rubbing to word or blot which is to be erased. When ink has disappeared remove excess fluid with blotter and paper is ready for use again.

To remove spots from fabrics apply fluid to stain, blot out, then apply a strong table salt solution to neutralize excess acid. This ink remover will sell wherever ink is used; first sales should bring many repeat orders.

6. WALL PAPER CLEANER

Powdered pumice stone	4 avoirdupois ounces
Wheat flour	24 avoirdupois ounces

Mix the flour and pumice with water to make a stiff dough. Roll this into a cylinder two or three inches in diameter, then cut up into six-inch lengths. Place each piece in a tightly-fitting muslin bag, closing ends by sewing. Drop all bags into pot of boiling water, and boil for one hour. Remove rolls, allow to cool for about 12 hours, then remove wrapping and hard outer portion of each roll. Pack the soft interior part into fibre cans (4 ounce size) to sell for ten cents. To use, rub over wallpaper.

7. RUG AND UPHOLSTERY CLEANER

Ammonia water	2 [illegible]
Soap solution	4 fluid ounces
Gasoline	4 fluid ounces
Chloroform	5 fluid drams
Potassium nitrate	2½ fluid drams
Oil of wintergreen	2½ fluid drams

Prepare the soap solution by dissolving ordinary laundry soap in hot water. Mix this with the ammonia water, add the gasoline, chloroform and oil, and finally the potassium nitrate which has previously been dissolved in water. This makes a milky solution which should be shaken before use. In preparing this compound, use only rain water or distilled water. The oil of wintergreen may be replaced by sassafras oil or omitted entirely. This solution cleans and restores the color of rugs and upholstery. Rugs do not even have to be taken off the floor. Remove grit and grime from the cloth used to apply the solution by dipping occasionally in a bucket of clean water. Always apply with a rotary motion.

8. ETCHING FLUID

Corrosive sublimate	½ avoirdupois ounce
Tartaric acid	20 grains
Nitric acid	15 drops
Water	12 fluid ounces

Simply mix ingredients together, pack in a two ounce bottle, label, and sell for about 25 cents. Every man owning tools is a prospect, for with this liquid names or initials are quickly etched on any tool. To use, first cover the steel being etched with a layer of soap or melted wax, then trace in the design or name with some sharp instrument. Apply the solution over the design with a brush. After a few minutes dip object in hot water to remove acid and wax or soap.

9. FURNITURE POLISH

Potassium carbonate	1 avoirdupois ounce
Soft or green soap	2 avoirdupois ounces
Yellow wax	8 avoirdupois ounces
Water	64 fluid ounces

Mix together and boil all ingredients until a uniform cream is obtained. Apply to surface with a soft cloth to obtain a high, permanent gloss. Pack in 8 ounce bottles to sell for ten cents each or more. This is a superior grade of polish solution, a year-round seller to housewives and in office buildings.

Don Benn Owens, Jr., will answer free of charge any questions you may have concerning any of these formulas. He will also send addresses of firms supplying the chemicals, containers, and bottles needed to start your own chemical business. Be sure to enclose a stamped, self-addressed envelope. Address him in care of Modern Mechanix Publishing Co., Fawcett Bldg., Greenwich, Conn.

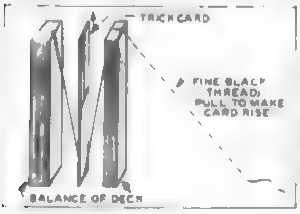
MECHANICAL CARD TRICKS

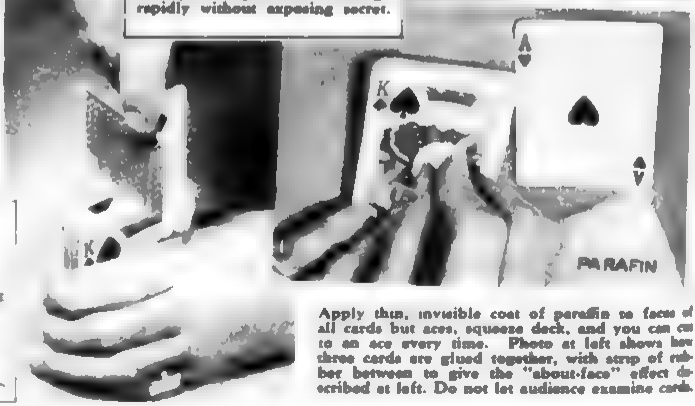
If opposite ends of each card in deck are glued together, entire deck can be "sprung" from one hand to the other with ease, imitating the flourish used by professional magicians after years of pra... By "fixing" decks of cards beforehand, you can perform this and other tricks that ordinarily would require much tedious practice

Cut two cards in fourths, then reassemble with a piece of thin live rubber cemented between. Pretend to cut the prepared card with scissors, but instead fold it over. Card will unfold when dropped into hat, appearing to be restored completely

The card at the right changes to an entirely different one by simply passing your hand over its face. Glue the ends of two cards together, back to back; fold the other ends outward and glue the backs to another card. In passing hand over card, move flap thus formed up or down to make the bewildering change. Practice this a few times before a mirror, until you can perform the change rapidly without exposing secret.

Trim narrow slices from ends of one card in deck, rounding off corners neatly. When the deck is riffled there will be audible click as cut card is passed. Chosen card placed next to this can be located instantly, even after cards are cut, by riffling deck. Use black thread in manner shown below to make a card rise mysteriously out of deck, back being visible. When half way out, card will turn about.





Apply thin, invisible coat of paraffin to faces of all cards but aces, squeeze deck, and you can cut to an ace every time. Photo at left shows how three cards are glued together, with strip of rubber between to give the "about-face" effect described at left. Do not let audience examine cards.

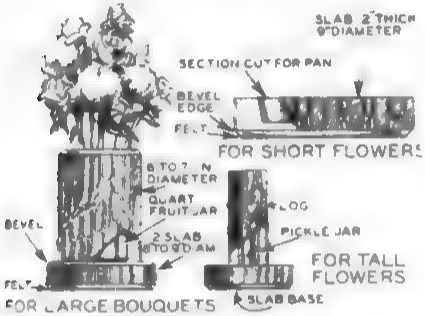
NOVELTY FLOWER VASES

Flowers Grow In Combination Lamp-Vase

FLOWERS planted in this unique pot are illuminated mysteriously from beneath, and at the same time supplied with ultra-violet light. A false wood bottom is fitted into a large porcelain or earthenware pot, high enough to allow room for the base of an electric light socket. Around the top of the socket is set a tin coffee can, extending up almost to the top of the pot. The space between this can and the pot is filled with earth, in which indoor flower plants are set. If pitch or putty is used to make the flower compartment waterproof, water may be poured in, and cut flowers used.—R. J. Adams.

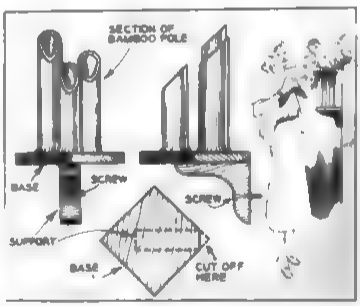
Artificial Flower Vases from Bamboo

NOVEL vases for artificial flowers can be made from bamboo fishing poles. Cut pieces through the joints to leave a solid bottom on each section used, then saw the open ends at a 45 degree angle. Make each holder a different length, as 5", 4", and 3". Glue the three holders to a plywood base, which in turn can be mounted on a wall with a wood bracket. In finishing the vase, do not sand the bamboo. Mahogany stain gives an attractive color to bamboo.—Joseph W. Allard.



Use Logs As Rustic Flower Holders

MANY different sizes of rustic holders for summer bouquets can be made from sections of logs and a few old bottles or jars. Saw out the slabs carefully, without injuring the bark, then drill holes and gouge out enough of the interior to make room for a glass jar. If a wood turning lathe is available, the center part may be hollowed out quickly and neatly by mounting on a face plate. Add a protective felt layer to the base, to protect varnished furniture. Finish with clear lacquer to prevent bark from chipping off. White birch or pine logs are ideal for these vases.—V. G. Everett.

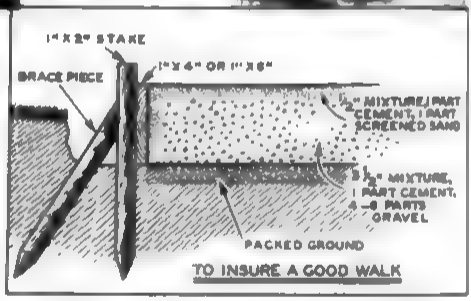


A Home Aquarium Cabinet

RADIO consoles in both floor and table models make excellent cabinets for the home aquarium. Cut a large hole in the front panel, then set a small glass aquarium behind, in the cabinet. For lighting tank at night, place two small light bulbs on either side. Remove the back panel of the cabinet. The bulbs will keep the water warm.—H. R. Wallin.

How to Use CONCRETE

These photos illustrate the steps in repairing a break in cement walk. Mix cement as directed. Clean out break with stiff brush and wash with water. For small breaks retaining wall is not needed. Trowel only can be used. After patch is repaired sprinkle top with pure cement, trowel down flush with old walk, and smooth off. Drawing below shows how to build the retaining wall for a new walk.



COSTING roughly around half a dollar, a sack of cement will go quite a ways for repairs about the home, but you must have plenty of sand and gravel.

If the sidewalk has been nicked, first soak the old break thoroughly with water and brush out all dirt and refuse. Soaking for an hour or more will be best. You can set the sprinkler to hit it with a small, steady stream. Mix up a cup full of pure cement in just enough water to make a paste, and slap this into the break.

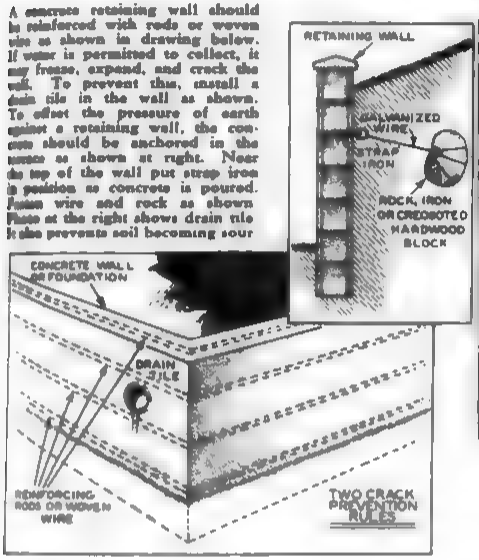
If the break is big, build a wall from a board to line up the new edge. If only a small break occurs you can use the trowel. Mix up a small batch of 1 part cement to 4 parts sand and gravel, then wet down with just enough water to make it plastic, and build up the break. Later sprinkle some pure cement over the top and finally trowel down flush with the old walk and smooth off. Let this set for two hours, then cover with an old gunny sack or some gravel, wet down and keep it wet for at least 36 hours. Such a repair won't break out again.

While your hands are still dirty from this job, go over the basement wall and chink any breaks or cracks, using the procedure mentioned above. Watch for cracks around flue connections, water pipe inlets and drains. For such small jobs, it is better to use 2 parts screened sand and 1 part cement. Better still, add ½ part of slaked line, as this helps to retain moisture.

Take a look at the chimney. If the top bricks are loose or the mortar badly cracked, make a cap of concrete by building a form for the outside, and another inside to line up the inner wall. Keep the top edges of the inside and outside forms level and then build up the concrete to these edges. Imbed woven

Around the HOME

Give your house a face lifting by fixing the walks, cracked walls, and broken down steps. Frost is the enemy of concrete. This spring follow these repair tips.



wire or bent iron rods in the corners. Scrape off the surplus with a straight edge and trowel smooth. A concrete cap will make a chimney last twice as long.

A walk will break down because the earth underneath was not properly tamped. Erosion of the soil at the side often exposes a too-thin mixture of concrete. This is due to the fact that the concrete at the crown of a rise of ground is spread too thin. It is better to dig away the earth to allow a walk thickness of 5 or 6 inches. Due to lack of reinforcing in a foundation corner, cracking results when a house settles. A double check against cracking at foundation corners can be made by sloping the foundation wall outward to act as a brace. This method is particularly appropriate when the building is built on sloping ground.

A circular seat to surround a young tree is a project requiring no particular skill or expense. Four nail kegs forms the moulds for the supports, while two 2½ inch wide strips of heavy galvanized iron, the ends soldered, form the seat mould. The kegs were simply filled with concrete and spaded to remove air bubbles from the sides, then allowed to harden. The seat was laid out on the drive with building paper underneath, and spacers temporarily used to make the width uniform. The mix used was 1 part white cement to 3 parts of screened sand, woven wire being used for reinforcing. The top was troweled smooth. The seat dimensions were, thickness, 2½ inches, diameter, 40 inches, hole 14 inches. The seat can be cast right around the tree, then lifted onto the supports.

If the cistern needs doctoring, why not put in a filter at the same time? The one shown isn't expensive and is easy to make. Once made, only an occasional replacing of the gravel and charcoal will be necessary. Clean sand can be used in place of the charcoal if desired. The sketch shows the installation.

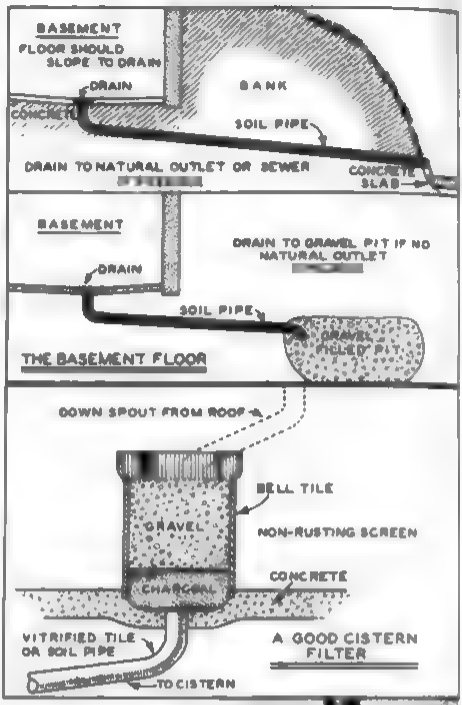
Now is also a good time to lay that basement floor. After the excavating, tamp the earth well. Lay the floor at least 2 inches thick and at least 6 inches above the bottom of the foundation. Every basement should have a drain. Lacking access to the sewer, two alternatives are shown in the drawings. The natural outlet is possible when at not

How To INSTALL DRAIN in Your Home Basement

too great a distance, you will find a spot lower than the basement floor. Piping the drain to this outlet is mostly a matter of digging. When the ground seems to run level or actually slopes upward, then about the only satisfactory drain will be to fill a hole roughly 4 feet square with coarse gravel or cinders, lead the drain to this with the end of the pipe turned down, then fill in. Be sure this outlet is several inches lower than the basement drain.

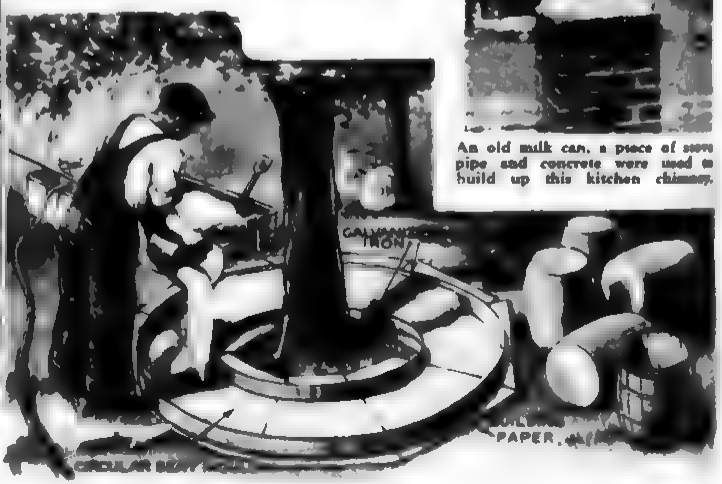
The use of tile drain is sometimes advisable too, when the yard is confined within a retaining wall.

As with other types of concrete work, retaining walls must have firm footings, proper reinforcing, and in addition, "deadmen" set at strategic points. These dead weights, set underground and well back from the wall, are connected to straps of iron set right in the wall by means of heavily galvanized, large diameter wire, and all slack removed. These weights help to counteract the tendency of filled in ground to settle and shift, and insure a wall with no bulges, even after many years. A well planned retaining wall can do wonders in improving the appearance of a lot. Often-times steep-hilled lots can be purchased at bargain prices and fixed up with concrete steps and retaining walls to make a really attractive home site. It is usually possible in these cases to build the garage under the home at street level. Done in spare time, work of this nature costs very little.



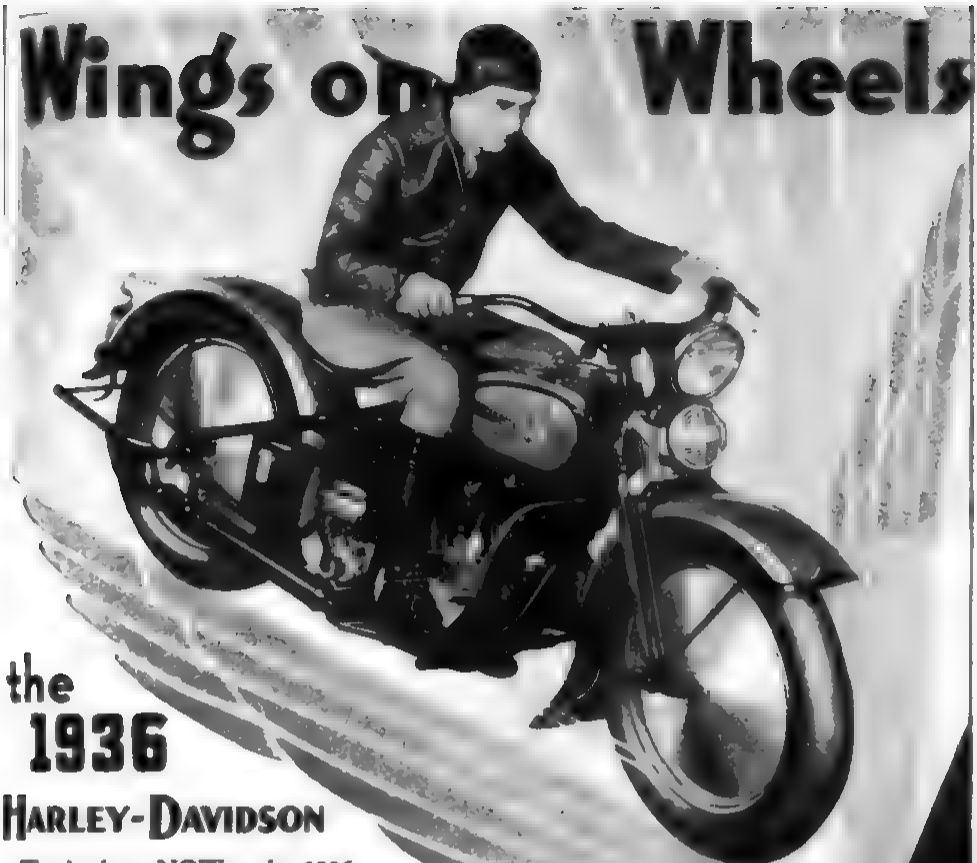
Two top drawings above show how to drain basement when sewer outlet is not practical. Bottom drawing is suggestion for a useful cistern filter for drain water from roof. It need be cleaned out only after several years' use. When laying basement floor, be sure that it is six inches above bottom of foundation. Soil pipe should incline several inches

An old milk can, a piece of stove pipe and concrete were used to build up this kitchen chimney.



Right—How to cast circular seat around tree. Above—The finished concrete garden seat. It can also be cast in two half sections and moved into place.

Wings on Wheels



the 1936 HARLEY-DAVIDSON

They're here NOW — the 1936 Harley-Davidsons—and they're the last word in motorcycle speed, power, and style. Yeah, man—an array of advancements and magnificent models—new cylinders and heads with deep cooling fanges—spring fork shield—a new 80 model—a new sidecar!

No use trying to tell you all about them—you'll have to SEE and RIDE one of these "Wings-on-wheels" motorcycles to get a good idea of the THRILLS that will be yours when you own one. See your nearest Harley-Davidson dealer NOW. Ask for a FREE RIDE on a 1936 Harley-Davidson. Ask him about his EASY PAY Plans—and send in the coupon.

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My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. (Check your age group)

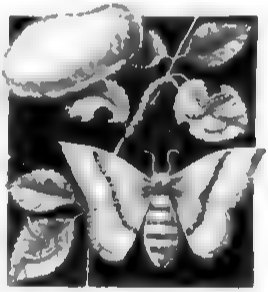
PARAGRAPH ODDITIES OF SCIENCE

BACK in 1840 bath tubs were regarded as an undemocratic extravagance, and in 1845 Boston prohibited their use by law. Virginia taxed bath tubs $30 a year.—Glen Kellogg, St. Louis, Mo.

Asia stretches 60 feet each month, and then shrinks back. The gravity of the moon is responsible.

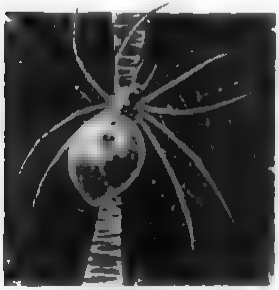
A watermelon seed confined in a heavy knot of wood into which it had fallen, sprouted and proved strong enough to split the knot.—Anna McFarlane, Oakland, Cal.

The silkworm butterfly, in escaping from its cocoon, uses one of its eyes to cut the silk threads. The microscopic facets of its eyes are hard, with a file-like sharpness.—L. P. Beland, Quebec, Canada.



The screen through which finished cement is sifted is so fine that water does not seep through.—La Vern Volberding, Latimer, Iowa.

Phonograph needles were blamed for fire disabling the battleship *Colorado*. Needles penetrated insulation of an electric cable, causing a short circuit. — M. A. Hall, White Plains, N. Y.



Nearly 700,000 spiders would be needed to produce a pound of web, though one spider can spin a thread 34,950 feet long.

The Nile river, though it drains a million square miles of land, is used so extensively for irrigation that only a small stream reaches the sea. In fact, dams are needed to keep the sea from flowing up the river.—P. C. Swaim, Berkeley Springs, W. Va.

The balance wheel of a watch makes 18,000 revolutions per hour. If revolving in one direction, this tiny wheel would cover 4,000 miles in one year.—Travis White, Los Angeles, Cal.

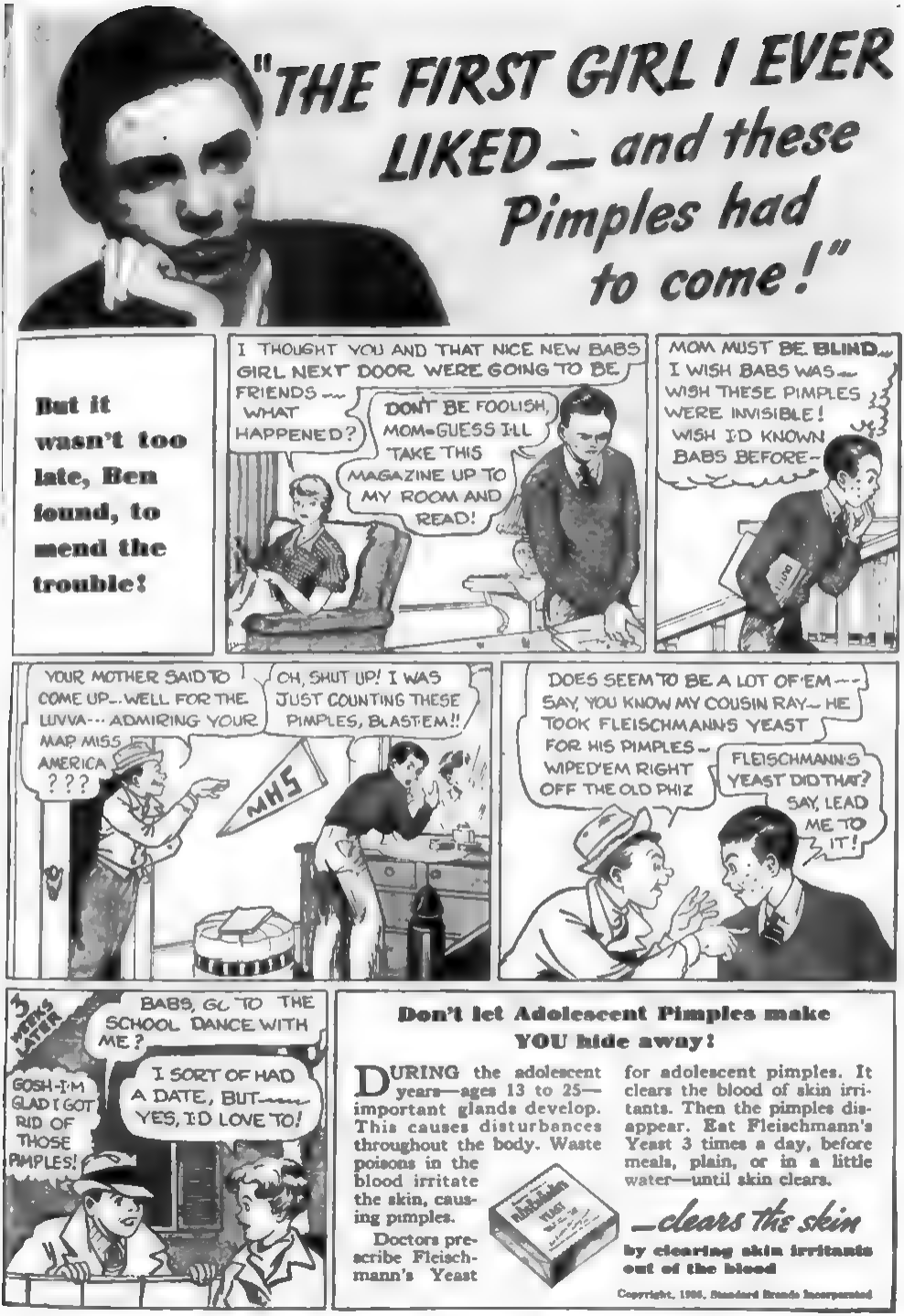
Ultra-short radio waves used to reach police cars in large cities do not pass directly from station to receiver but bounce from building to building like echoes.

Water encountered in tunneling beneath Mt. Blanc in the Alps will be captured and put to work. As the rock is cut, it will be pulverized and carried away by the streams.

The world's tiniest train, built entirely of gold and silver by an English watchmaker, has an engine 1⅜ in. long. It runs by clockwork at a speed of 3 miles a year.—R. Flugaur, Finley, Wis.

A furnace door which bulged out when hot, and in when cold gave John Spencer the clue to the Spencer thermostat which he sold for $1,000,000.—C. J. Ruppert, Buffalo, N. Y.

One dollar will be paid on publication for every Paragraph Oddity accepted. State source or proof. Do not include Oddities with contributions or letters for other departments. No items will be returned.


"THE FIRST GIRL I EVER LIKED — and these Pimples had to come!"
But it wasn't too late, Ben found, to mend the trouble!
I THOUGHT YOU AND THAT NICE NEW BABS GIRL NEXT DOOR WERE GOING TO BE FRIENDS — WHAT HAPPENED?
DON'T BE FOOLISH, MOM—GUESS I'LL TAKE THIS MAGAZINE UP TO MY ROOM AND READ!
MOM MUST BE BLIND... I WISH BABS WAS— WISH THESE PIMPLES WERE INVISIBLE! WISH I'D KNOWN BABS BEFORE—
YOUR MOTHER SAID TO COME UP—WELL FOR THE LUVVA— ADMIRING YOUR MAP MISS AMERICA ???
OH, SHUT UP! I WAS JUST COUNTING THESE PIMPLES, BLAST 'EM!!
MHS
DOES SEEM TO BE A LOT OF 'EM— SAY, YOU KNOW MY COUSIN RAY— HE TOOK FLEISCHMANN'S YEAST FOR HIS PIMPLES— WIPED 'EM RIGHT OFF THE OLD PHIZ
FLEISCHMANN'S YEAST DID THAT? SAY, LEAD ME TO IT!
3 WEEKS LATER
BABS, GO TO THE SCHOOL DANCE WITH ME?
I SORT OF HAD A DATE, BUT— YES, I'D LOVE TO!
GOSH—I'M GLAD I GOT RID OF THOSE PIMPLES!
Don't let Adolescent Pimples make YOU hide away!
DURING the adolescent years—ages 13 to 25—important glands develop. This causes disturbances throughout the body. Waste poisons in the blood irritate the skin, causing pimples.
Doctors prescribe Fleischmann's Yeast for adolescent pimples. It clears the blood of skin irritants. Then the pimples disappear. Eat Fleischmann's Yeast 3 times a day, before meals, plain, or in a little water—until skin clears.
Fleischmann's Yeast
—clears the skin
by clearing skin irritants out of the blood
Copyright, 1936, Standard Brands Incorporated

Tackle for Ocean and Gulf Fishing

[*Continued from page* 71]

wobbling or drone spoons are exceptionally taking at times. *Line:* A 9 to 24-thread cuttyhunk line is often used. It may be stated that when one gets into a school of kingfish, a bait casting rod of the inland bass type provides sport second to none. Record kingfish—105 pounds.

Spanish Mackerel: A 6 to 9-ounce rod may be used in this type of fishing.

Striped Bass and Channel Bass: While it is stated that the largest striped bass caught with fishing tackle weighed 73 pounds, it is possible that larger ones have been taken on both coasts. The largest channel bass weighed 74 pounds. Along the Atlantic coast surf casting for both types of bass is the most popular method. *Surf Rod:* The rods in this class come with a long tip and a spring butt, the tip generally around 6½ feet, and the butt 2½ feet, totalling 9 feet over all and having a weight of 16 to 24 ounces. *Reel:* It should be double-multiplying and provided with a throw-off lever which assures a free-spool action when the bait is cast, but gears in when

[*Continued on page* 132]

ADLETS FOR HOBBYISTS

(See regular classified section for rates and other information.)

STAMPS

SCARCE "NEW ISSUES" PACKET! New giant sized, diamond shaped "sports" stamp from Russia; Nyasaland "leopard"; Sudan camel; Spanish Morocco, Tanganyika, and other scarce countries are included in our big packet of new and recent issues stamps which most collectors have never before seen! Get this valuable packet today. Only 5c to approval applicants. Reimers, 115 Flatiron, Fort Worth, Texas.

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SCARCE NEW GUINEA AIRMAIL, also Bolivia triangle, with fine packet including Ubangi Chad, Gabon, Inini, St. Pierre, Togo, Senegal, savages, ships and animal stamps. Only 5 cents to approval applicants. Potomac Stamp Co., Dept. 902, Washington, D. C.

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Much special equipment has been designed and built by Ford for specific purposes such as the machine which tests distributor governors and distributor vacuum brakes. It duplicates all conditions of speed and load which affect these units in actual operation.

Distributor rotors are subjected to high-tension current from a 30,000-volt transformer to determine their dielectric strength. Ignition points are life-tested on a machine that operates 24 hours a day. All this helps Ford engineers to work out the best designs and select the best material for every part.

Steps are always being made to reduce service costs for Ford owners. The distributor breaker-plate and point assembly is now included in the Ford factory-exchange items. It includes the plate, spring and the two sets of ignition points. The exchange price for this factory-reconditioned unit is low.

Distributor breaker-plate and point assembly is now included in factory-exchange plan.

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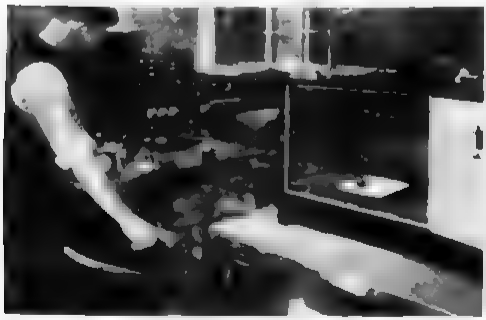

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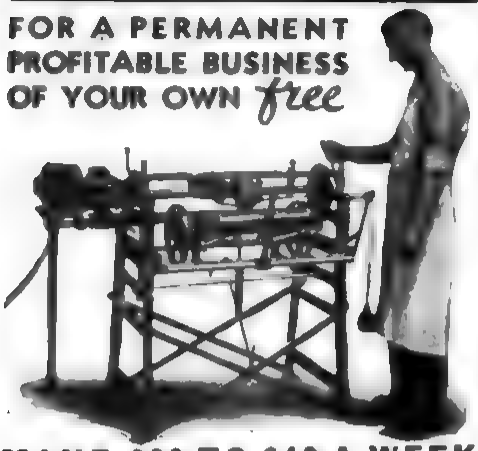

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[*Continued from page 92*]

half as the detector. A midget 4-4 mfd. electrolytic filter condenser and a 20,000 ohm ½-watt carbon resistance complete the power supply.

A coil constructed on a 1-inch form covers the broadcast band. Bakelite or cardboard may be used for this. The secondary or grid coil winding has 114 turns, the 8-turn antenna winding being wound on the upper end. The 14-turn plate coil is wound on a separate form, and slid into the opposite end of the large coil form. When the best location is found, this coil is cemented in place.

The tuning condenser, the regeneration control (a 50,000 ohm potentiometer) and earphone jacks are mounted on the lid. The usual 100 mmf. midget condenser is used for tuning. The potentiometer is one of the new midget potentiometers, hardly more than a quarter-inch thick.

The 7-prong socket is mounted in the end of the box on brass studs. A brass stud also holds the coil and the antenna binding post in place. Grid leak and grid condenser are cemented to the box with acetone, as also is the filter condenser. The tube is heated by a 40-watt house lamp connected in series with the line. It is only necessary to plug the set into the electric outlet and then plug a table lamp containing the 40-watt bulb into the top of the special plug used by the receiver. This plug is a 10-cent flasher plug with the thermostat removed and the filament connected in series with the brass lugs that remain.

If a bakelite container is not available a plywood box can be constructed.

Curiosity Shop of Science

[*Continued from page 61*]

mount the mammoth found 15 feet underground at Randolph, N. Y., for the New York State Museum at Albany.

BIG BUGS: Among thousands of specimens, here's a perfect one of the largest insect known, the "walking stick," 16 inches long. Also the most popular, the black widow spider, the female of which is much more deadly than the male. They are much in demand now as a result of their publicity.

BARE BONES: There's money in them. Gorillas are becoming rare; their skulls bring $125 each, compared to skulls of such strange creatures as the koala or Australian treetop bear ($1.50), phalanger ($2.50), peccary ($5), kangaroo ($1.50), and manatee ($10-15). The human skeletons hospitals and colleges use, are not American, but Hindoo.

THE ODDEST JOB Ward's ever did was to make a sea-serpent for a circus of 40-foot stove pipe, rubber hose and shark's teeth.

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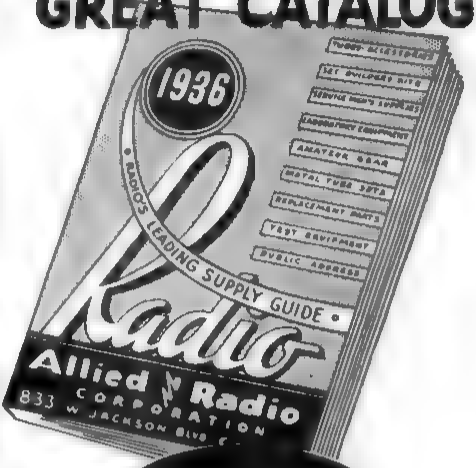

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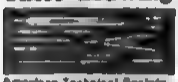

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Twilight City—Where Snapshots Are Born

[*Continued from page 86*]

taken annually are made on film which actually is double-coated with separate emulsions. Verichrome film is a popular example of double-coating which, along with a tinted film base, prevents halation when pictures are taken into the sun or other light.

Because proper temperature must always be maintained without any variation, large air-conditioning pipes radiate like the spokes of a wheel from a central building which comprises the world's largest refrigerating plant.

For the manufacture of amateur roll film, ingenious machines affix the paper backing for the film, and spool and wrap it. Film spooling must be done under safelights to prevent fogging. With panchromatic film, a low-intensity green lamp is employed.

Film Negative Only Half the Story

But the film negative itself is only one-half of the story. Sensitized photographic paper from which positive prints can be produced next enters the picture. It took years of research to discover a suitable paper stock which when sensitized would not degenerate.

The manufacture of photographic paper differs from ordinary paper-making since tile must line not only the interior of the "beaters" in which the fibers are torn apart, but also the huge vats in which the pulp is stored and the pipes through which it passes. No traces of metal must appear in the paper.

After seasoning, a baryta coating (barium sulphate) is applied as an intermediate layer to separate the paper from its emulsion coating and give the paper the variety of surfaces that are available.

Tremendous Pressure Smoothes Paper

The coated paper then passes, ribbon-like, through long drying tunnels to the winding machines where it emerges in huge white rolls. To tighten the formation of the paper, improve the surface and increase its strength, giant super-calender machines exert tremendous pressure, smoothing the surface prior to applying the sensitive emulsion.

A complete wood-working and metal-working shop turns out the wooden and metal cores and reels on which movie and still films are wound. The film cartons are produced in the special paper-box factory and printing plant located within the Park.

In addition, photographic chemicals necessary for the developing and fixing, as well as the intensifying, toning and bleaching of negatives and prints must be produced. Then there is the camera works plant where inexpensive box cameras rub elbows with costly amateur movie apparatus designed and assembled by expert craftsmen to record images even more faithfully than the eye.

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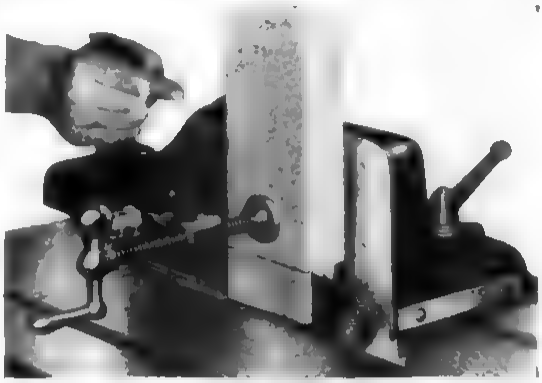

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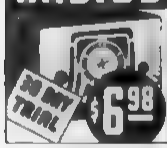

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Plays That Win In Basketball

[*Continued from page 59*]

closes in No. 3 can pivot and pass to No. 4 who has been freed and is open for a shot.

In another scoring play, player No. 4 crosses over the free throw line to pull his guard out from under the basket. No. 2 fakes to his left and then cuts back to his right as No. 1 screens out his guard. No. 5 fakes a shot at the goal and then passes to No. 2 who drives in fast and attempts to score. If the goal is missed, players No. 3 and No. 5 are following in to take the rebound.

Scoring plays aren't the only set formations used by fast teams. Fig. 3 shows the "Y" type of tip-off formation for use when a team's center is able to control the tip-off. According to signal, the ball is tipped at an angle into one of imaginary tipping lanes where it can be taken by the player designated by the signal. If, however, the center is being out-jumped it is necessary to resort to a play similar to Fig. 1. This un-balanced formation places a team's strength in the opponent's front court where it may close in on the man receiving the tip. Fig. 2, is a balanced formation for use when the tip may be counted on.

With the ball being played in from the side line, Fig. 7, No. 2 rushes in and calls for the ball to draw attention from No. 5 who

[*Continued on page 138*]

Aviation Needs Inventions

[*Continued from page 77*]

article a knowledge of aviation is by no means essential.

The man who can either prevent ice from forming on airplane wings or can remove it as fast as it is formed remains to be found.

What man can suggest an emergency aviation ignition system that will automatically start functioning should the regular system fail?

One of the most annoying problems that the airplane designer has to work with is that of insulating the cabins of passenger planes from the roar of motor and wind. Perhaps a motor muffler would simplify construction of present sound-proof cabins.

The aviation industry will pay good money for a parachute that does not require any experience on the part of the air passenger.

The aviation toy field also provides the inventor with a number of opportunities. What child would not give a great deal to have a captive airplane operated by a tiny 100-a.c. motor, or a toy airplane that would hop out of its tiny hangar and take to the air propelled by a simple spring or rubber? Both would be big sellers if kept within a nominal price range.

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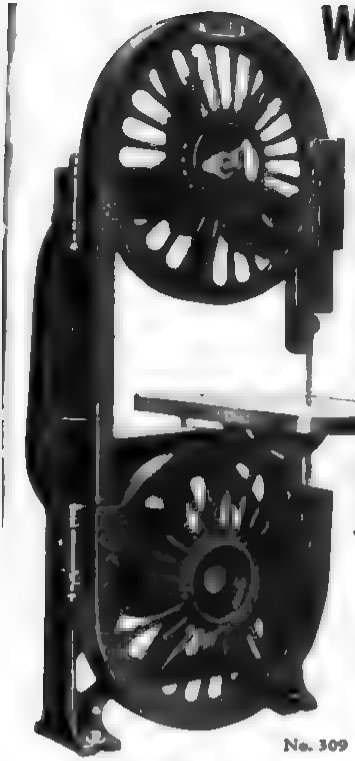

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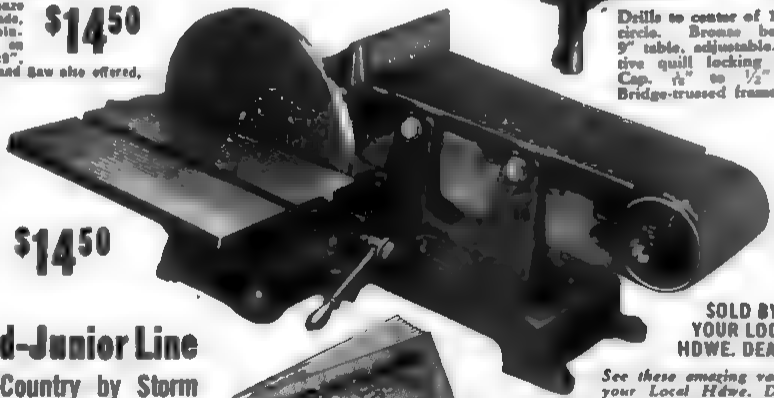

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Skate Sailing Is Mile-a-Minute Sport

[*Continued from page* 107]

The Nyack sail has long been used for racing. The beauty of this type is that it can be reefed for strong winds in which other sails would have to be abandoned. Two bamboo poles ½" in diameter should be used as battens, which fit into pockets. Spars should be made from 1½" spruce.

Like everything else, skate sailing should be learned from the ground up. After rigging the sail and before starting out to sail with it, pick it up by the extreme front end and swing it into a horizontal position over your head. Be sure to face directly into the wind. The sail will float, spilling all the wind. It is important to be familiar with this maneuver as this position is used for stopping, turning and resting.

To get under way, rest the boom on your shoulder. Slant it slightly downward at the rear. Balance at a point a trifle back of the celluloid windows so that you can conveniently locate obstructions, or avoid skaters and iceboats. The hand on the same side grasps the mast at a comfortable distance below the boom; the other hand is free and not used to hold the sail while sailing. The pressure of the wind holds the sail securely against your shoulder.

Stunts for School Carnivals

[*Continued from page* 103]

to the others except for the counter, which is cut short.

A high wattage lamp with a desk lamp reflector is suspended so that the head and shoulders of the subject are thrown in silhouette upon a ground glass square 18"x18" in the front wall of the operator's booth.

By means of a pantagraph the outline of the shadow cast on the ground glass is reduced and traced in white outline on a small piece of black paper. This sketch is cut out by an assistant, pasted onto a small white card and returned to the subject through a slot provided for that purpose. Another slot cut in the front of the cubicle and appropriately marked is for receiving a coin. A bell is placed below it in such a way that it is rung when the coin is dropped.

The pantagraph is constructed of light wood strips ½" wide. Dowel C has a rounded tip. Dimensions are: A to B—4"; B to C—17"; E to D—17"; B to E—4"; C to D—4"; C to G—21". Holes are drilled in both strips at E to take a pencil having white lead.

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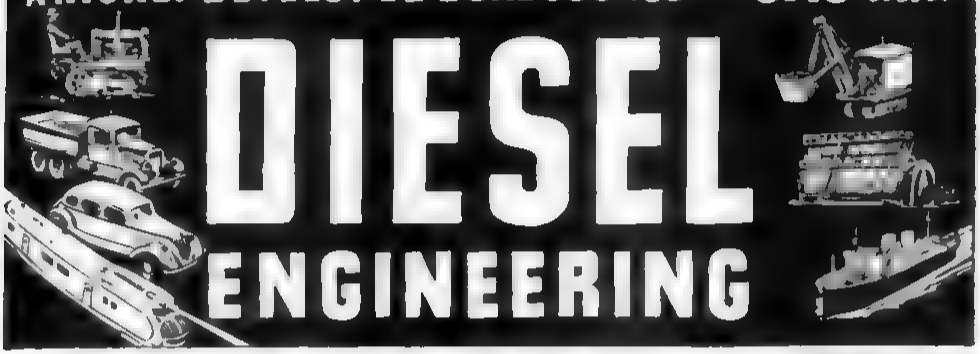

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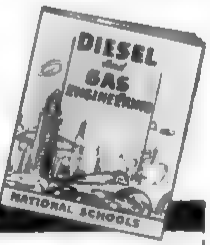

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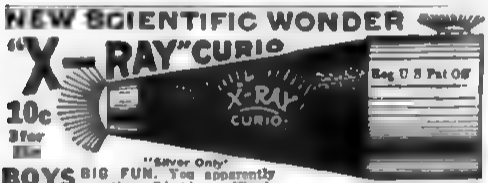

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Keeping Firemen Away from Door

[*Continued from page 79*]

hang by your hands from the window as long as you can. Sometimes an added second or two will give firemen a chance to reach you.

Make a personal inspection of your entire home to determine what fire hazards exist.

Test Chimney and Flues

Test flues by blocking off the opening and building a smudge of damp grass or rags in the furnace. Any cracks which have developed due to settling will be revealed by the escape of smoke.

Where there is insufficient space between the walls and the hot air pipes or flue there is a need for more asbestos insulation on the pipes.

Clean your chimney every fall so that the soot and carbon cannot ignite and set fire to the roof. Provide a metal receptacle or a brick bin for ashes and clean the accumulation of coal dust out of the bin before storing the winter's supply of coal. Coal and wood dust, mixed in the proper proportions with air or oxygen will explode with terrific force.

The same danger may exist on a smaller scale in home workshops where lathes and rotary saws are used. Keep sawdust from accumulating.

Inspect extension cords and the cords on all electrical appliances to be sure they aren't worn. Worn insulation or faulty connections cause short circuits which may result in serious blazes.

Even the apparently harmless kitchen stove furnishes several fire hazards. Smother the flame from burning grease by slipping the frying pan into the oven. If the blaze is so hot that you are unable to pick up the pan, don't attempt to extinguish it with water. This will only make the grease spatter and the flames spread; smother it by carefully slipping a large lid over the pan, or by throwing a rug, blanket, or gunny sack over it.

Keep Gasoline OUTSIDE

Remember, too, that gasoline is one of the most powerful explosives in common use. Always use gasoline OUTSIDE THE HOUSE where there is plenty of fresh air.

Gasoline vapor is heavier than air and settles, thus increasing the danger. When mixed with the proper amount of air it will ignite from the tiniest spark and explode with terrible force. The spark produced in an electric light switch has been known to do the trick, while the static spark produced as you walk across a heavy carpet will also set it off. Even a spark produced by a nail in your shoe as it strikes against a concrete floor will explode gasoline vapor, and remember to be sure the pilot light in the stove is also extinguished.

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[*Continued from page* 57]

type of fiber has characteristic structure or markings, and occasionally a distinguishing shape, as the flattened and twisted cotton fiber or the tubular construction of rayon. In general, animal hairs are identified by the specific pattern of the tiny cuticular scales which invest the hair shafts, while in plant stem fibers the basis of separation of types is concerned with spiral thickenings, rings and pits.

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Safety on the Triborough Bridge

[*Continued from page* 44]

deflect 14 inches under the most extreme conditions of load and temperature, so that normally they will approximate true vertical. The mighty power of the wind is a factor here—it can exert a force of 1,200 pounds per lineal foot of bridge.

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[*Continued on page* 140]

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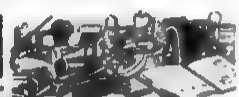

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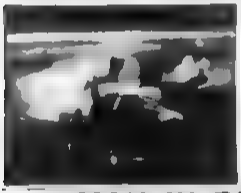

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Tackle for Ocean and Gulf Fishing

[*Continued from page* 118]

the fish has been caught and the hook set.

Amber-Jack: Here is another member of the well-known pompano family, the heaviest fish on record in this species, taken on hook and line, having weighed 110 pounds. *Rod:* For trolling a six-strip bamboo rod, 9 to 12 ounces in weight, is used, the same being the usual 60-inch, one-piece tip, with butt section separate. *Reel:* A 6/0 to 4/0 reel is generally used. *Line:* A 21-thread Cuttyhunk line is the usual selection. *Hook:* A No. 9/0 to No. 10/0 hook is commonly used when trolling with strip bait, or when still fishing with live bait. The amber-jack is sought after a great deal by the fishermen and is a real fighter. Record amber-jack, 110 pounds.

Bonito Popular on Both Coasts

Bonito: In Florida waters there are found the common bonito and the Arctic bonito, while in the Pacific ocean, is found the California bonito. These bonitos all belong to the mackerel family. They range in weight from 6 to a possible 30 pounds, although the largest California bonito on record, caught on hook and line weighed only 20 pounds. For all the bonitos a medium-heavy trolling rod of the sort used for the rest of the salt-water fish given, is recommended. Strip or cut-bait proves very successful, as also various wobbling and drone spoons, and squids.

Albacore: The albacore is found from Southern California to San Francisco; the largest fish of this species taken on hook and line weighing 66½ pounds. Most albacores however, range around 15 to 30 pounds. *Rod:* A 9 to 12-ounce trolling rod as used in salt water is a recommendation. *Reel:* The 4/4 reel handles well, and is large enough for trolling. A large variety of spoons of the wobbling type are used.

Barracuda: Handle With Care

Barracuda: Here is the old assassin himself, in person, a dangerous fish that has the reputation of being able to snap your arm off if it gets in the way of those scissor-billed jaws. There are two species, the great barracuda on our East Coast and the Gulf; and the California barracuda, chiefly found around Southern California. The former grows to a generous weight, the largest, taken on hook and line, having weighed 103¾ pounds. The latter is a smaller fish, the largest on record weighing 20 pounds as taken on hook and line. The same tackle as used for many of the other sea fish of medium weight is a suggestion.

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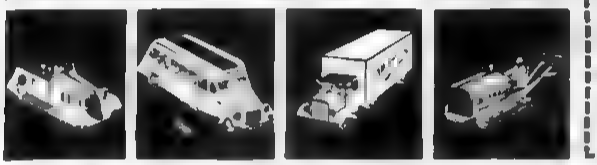

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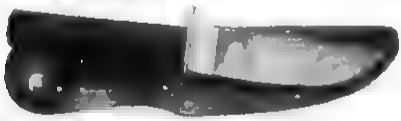

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Flying the 50-Ton Pacific Clippers

[*Continued from page* 38]

tary airplanes, the first and cardinal rule in test flying large amphibians and flying boats is to take no unnecessary chances. When ready to take off on the maiden trial flight, I first test the engines to make sure they're delivering full power. Then I set the stabilizer at the neutral position. With the engines ticking over rythmically I reach upward to the four throttles, suspended from the cabin roof, and shove all four forward together, opening them gradually. As the plane gathers speed, and climbs up on the step, I begin to try the controls, moving ailerons, rudder and flipper slightly. Through the cabin windows I can see the ailerons move up and down—but will the plane respond?

The Ship Takes Off!

After running the distance of two city blocks, I know. By that time the great pontoon has risen three feet in the water and we're skimming along 50 miles an hour on the step. Yes, the controls are beginning to "take hold." A moment later, with a rising crescendo of power, the Hornets pull the big ship into the air.

I never have time from that instant until we skim down to a landing to think of possible difficulties. True, unexpected things sometimes happen, particularly when trying out new equipment. For instance, when testing one of the 19-ton S-42 series, I was to try out the effectiveness of a new type wing flap.

As the ship roared forward at an altitude of 6,000 feet near Bridgeport, Conn., I applied the flap, turning the lever which caused it to move downward. This change in angle to the air stream was expected to send the ship downward in a mild dive.

Instead of nosing downward, however, when the flap took hold the nose suddenly rose. The huge ship actually tended to turn into a vertical climb and loop-the-loop. I speedily shoved the wheel forward and rolled the stabilizer down to overcome the climb and bring the plane once more into level flight.

"Why," I remember asking myself, "did the flap send us up instead of down, as expected?"

"Airfalls" Sinks Tail of Plane

Soon I understood. The tremendous downwash from the lower side of the wing and the flap on the wide hull, which the flap almost touched when in the down position, and on the tail surfaces, produced very much the effect of a waterfall. The force was so great it created suddenly an extreme tail-heavy condition. With that knowledge, we were able to correct the trouble.

These flaps make possible amazing performances with these trans-oceanic planes. By winding down a flap to a maximum of 40

degrees, the pilot converts a speedy wing into a wing of very high lift, enabling him to land at a speed of some 60 miles an hour. Without the flap, he would land at 90 miles an hour.

Of the S-43, first of a new series of twin-engine amphibians capable of a 200-mile-an-hour speed, we now have propellers which can be set to turn at constant speeds, no matter whether the pilot is climbing, flying level or diving; brakes for stopping propellers in mid-air and adjustable "tabs" for setting control surfaces at any desired angle, to relieve the pilots of wearisome duty under unusual conditions of flight.

Robot Controls Propellers

Suppose I desire all propellers to turn 1,800 revolutions a minute. I make the desired speed-of-rotation setting. After that, the hydraulic system fixed to the propeller hubs takes over the job. In taking off, I open the throttles, the props quickly rev up to 1,800, then as increased power from the engines pours into the blades, which ordinarily would increase their speed even higher, the pitch of the blades changes automatically so that they take bigger bites of air and thus provide greater pull. If I dive, the blades assume an increased pitch, but do not spin.

All right, suppose I cut out an engine. Now all I need do is to open an air valve which starts a mechanical pump which applies hydraulic pressure by means of a belt and internal expanding pistons to that particular propeller. In five seconds it stops.

Most of the time, of course, in testing I handle the controls myself. Recently we have added "tabs" to the control surfaces. These are really small auxiliary controls which, when set in one direction tend to drive the control in the opposite direction. For instance, if the ship for some reason is flying left wing down, I set the "tab" on the left aileron in an upward position. This, through force of the air stream, forces the aileron downward, which in turn acts to raise the wing.

Instruments Too Much for One Man

It is a physical impossibility for one man to watch all instruments, however. Both when taking off and on a trial flight I watch the tachometers, which register revolutions of the engines, and the manifold pressure most closely.

There are the instruments of navigation, compass, directional gyroscopic compass, sensitive altimeter, air speed indicator, bank and turn indicators and the rate of climb indicator. With them also are instruments which govern the automatic pilot, the flap position indicators, indicators which show the oil pressure within the flap control system and the position of the "tabs." Also, for good measure, two clocks.

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Oil—Modern War God

[*Continued from page 65*]

are hints in Italian diplomatic circles that an embargo on oil would cause Italy to quit the League of Nations, call home her diplomats from the powers implicated, and even bomb the British fleet in the Mediterranean. This bombing, it is said, would be done by a squadron of aviators pledged to crash their death-laden planes in suicidal dives directly onto the decks of British ships. Such an attack would mean that the world would be thrown into an international war.

The United States was among the first to threaten to cut off the fuel pipe line to Italy. Under the provisions of the Neutrality Resolution our government has cut off munitions shipments to Italy; and Secretary of the Interior Ickes, as petroleum administrator, has called on oil producers to cease selling to belligerents.

Needs 50,000 Gallons Daily

Should the League of Nations impose an oil embargo, it is believed Italy's guns in East Africa would be effectively spiked. Italy may be able to struggle along with her present supplies of coal and iron, but reinforcements in petroleum products must go on. Her reserve supply of the vital liquid, it is estimated, will last about three months. Her 5,000 motor vehicles and 250 planes consume about 50,000 gallons of gasoline daily; and this does not include domestic vehicles and warships.

An embargo on oil would encircle Italy with a force more powerful than arms. It would make a colossal failure, a laughing-stock, of the entire Ethiopian campaign.

Would Mussolini give up his purpose, withdraw his troops from the field, and retire quietly to Italy? More probably an oil embargo might mean that the Italian forces would be recalled while the oil reserve still lasts, to be hurled furiously at the nations enforcing the embargo. This would be war, deadly war—the world's first battle over oil.

Gas Sells At $1.20 a Gallon

At the height of the Ethiopian campaign gasoline sold in Italy at $1.20 a gallon—a potent reason why Italy's streets are almost barren of pleasure vehicles. Patriots were urged by the Fascist press to use railroads and buses, so that petroleum products may be saved for use in Ethiopia.

Will lack of oil and gasoline stop her from attaining her ends? Italy answers no. And it may yet be that oil—a lubricant and a source of power—will serve as the percussion-cap exploding Europe and the world with death and destruction or it may bring peace to the war-tired earth.

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Plays That Win In Basketball

[*Continued from page* 124]

fakes a drive for the basket and then cuts back toward the center where he receives the pass. No. 4 screens the guard covering No. 5, while No. 3 screens the guard covering No. 1 who drives in for the pass from No. 5 and trys for a goal.

The free throw offensive formation, Fig. 6, is used to recover the ball after an unsuccessful free throw so that a try for goal may be made. No. 1 and No. 2 both rush and jump for the ball, attempting to tip it back at an angle of about 45 degrees to players No. 3 and No. 4 who rush to the points indicated. No. 5 closes in to take a pass if neither man is able to get free for a shot. If this happens the players go into one of the scoring formations and the play continues as explained before.

These are but a few of the many plays that may be employed during the course of a game. Different situations call for different formations, but more than any thing else the choice of plays is governed by the ability of the players and by the style of the opponent's play.

Build accuracy in goal shooting by practicing with a back board which has been marked with black lines as shown in Fig. 8. The safest shot is the front arch shot to the 18" square above the ring. Shoot for a clean shot that just clears the rim of the basket, so that if overshot it will strike in this area and rebound into the goal. From right under the basket aim for the lower spots and put english on the ball. When shooting from the two corners of the court, aim for the closer diagonal zone on the board, attempting to carom the ball into the basket. The nearer you are to the side line the higher in the zone the ball must strike and the nearer you are to the end line the lighter the ball must be caromed.

Remember that speed and correct form are more desirable in a guard than size and weight. Keep between your man and the goal when guarding and always approach an offensive man in such a way that you can move quickly in any direction. Fig. 4, shows the correct position of the feet when approaching and stopping a dribbler. Hold the forward hand a little higher than the shoulder and at arm's length to block a pass and the rear hand downward in position to stop a bounced pass.

The dribble should be used sparingly and only as a means of getting clear for a short shot or a pass to a team mate. The dribbler should, in most cases, be followed at a few paces by a mate, so that if his progress is blocked by an opposing guard he may pivot and pass to this trailing mate. Fig. 4, shows the position of the feet in the different pivots.

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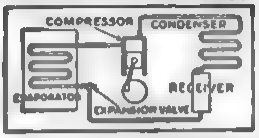

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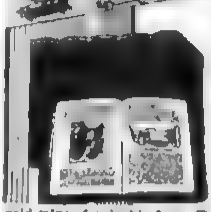

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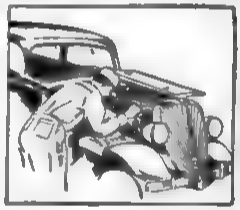

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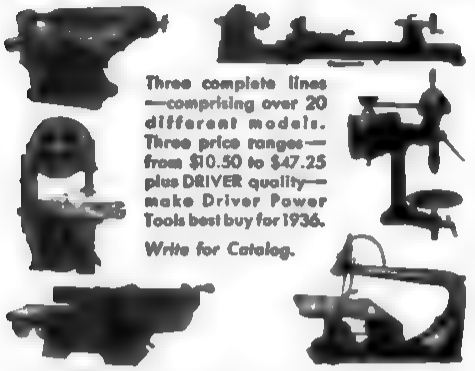

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Safety on the Triborough Bridge

[*Continued from page* 130]

is a vertical lift which raises a 310-foot section of the 67-foot roadway from 55 to 135 feet above the water. This is the largest vertical lift bridge in the world, which shows the magnitude of Triborough's bridges—one is the largest of its kind, another prospectively still larger.

Triborough engineers knew that this unparalleled network of bridges would be of little use if vehicles could not reach it with speed and safety. To facilitate entrance to the 3½ miles of bridge and viaduct structure they conceived a gigantic 14-mile system of highway connections reaching 6¼ miles into the Bronx, a like distance into Queens, and 1½ miles into Manhattan.

No Traffic Lights on Super-highway

Grade crossings and traffic lights are taboo. Speed is the keynote, safety the watchword of the Triborough project, which will accommodate 55,000 vehicles per 12-hour day.

The Queens approach, where 600 families had to be moved from the site, descends from the suspension span along 1,570 feet of viaduct. This plunges into the earth at 29th Street, where it becomes a depressed express highway bridged by cross-streets. Where this roadway passes under the New York Connecting Railway at 42nd Street, the railroad viaduct footings were lowered to bring them below the roadway surfaces—and this without even delaying a train!

To the north, skirting Flushing Bay, sweeps the magnificent new Grand Central Parkway with two 32-foot roadways. It was necessary to dump thousands of cubic yards of sand-fill into the mud of the waterfront to support this parkway. Lacking the dramatic appearance of the aerial work, this fill was yet considered by Colonel Loeser as one of the most difficult features of the project.

Impressive Mall Adds to Beauty

From the 70th Street emergence another prodigious highway, Astoria Boulevard, continues straight ahead. Here two 42-foot roadways divided by an impressive mall will conduct traffic to or from the Long Island highway system.

The Manhattan approach paralleling the Harlem River will embody two three-lane roadways separated by safety strip, a fifteen-foot sidewalk on the city side, and a 40-foot mall on the river side. Arched by grade-separating bridges, this drive gives a mile and a half of easy, swift access to the bridge for hurried Manhattanites. The approach systems in the three boroughs ramify from the central intersection on Randall's Island much as the blood ramifies from the heart to the arteries to the veins in the human body.

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Tiny Gadgets Make Great Autos

[*Continued from page 54*]

De Soto by jeweled lights. Pierce-Arrow, Chrysler and Plymouth also offer this improved lighting mechanism.

The use of hydraulic brakes is now practically universal. Hudson and Terraplane provide both hydraulic and mechanical brakes in what is described as duo-automatic design. In several cars the emergency brake lever has been moved beneath the instrument panel at the driver's left.

Mechanically minded men will find much in the new cars to challenge their interest, notably in the adoption of superchargers and the further foolproofing of the motor mechanism.

To the uninitiated the supercharger, which multiplies the power derived from a pound of fuel, may sound like a mysterious mechanism, but its operation is extremely simple.

Supercharge Evens Power Flow

The supercharger is mounted between the carburetor and manifold of the motor and is scarcely larger than the familiar air cleaner. It receives the fuel mixture from the carburetor, whirls it through the vanes of a rotor revolving at six times the engine speed (as much as 24,000 revolutions a minute) and forces the completely atomized charge into the cylinders at uniform pressure. Auburn and Graham offer cars thus equipped, with Duesenberg presenting the same feature in the custom-built field.

As predicted in a recent issue of Modern Mechanix and Inventions by C. L. Cummins, noted builder of Diesel motors, the Diesel-powered automobile makes its bow this year. Auburn has designed a nine-passenger Diesel car which burns fuel oil at seven cents a gallon instead of gasoline. Engineers are keeping close watch on this development, aware of the tremendously increasing importance of the Diesel in American industry.

Automatic Spark Proves Popular

Automatic spark control is featured on a majority of the new cars. Automatic choke control is a brand new idea. The driver need not pull out the choke lever when starting in cold weather—the adjustment is taken care of automatically according to the needs of the warming engine. Dodge and La Salle offer this feature.

Electrical engineers have contributed a new air-cooled generator. Vanes are placed at the forward end of the generator which force cooling air through the rotors. The charging rate has been made automatic, varying with the fluctuating demands of the battery. The electrical inventor, in fact, has

[*Continued on page 146*]

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Address _____

Attach letter stating age, occupation and name and address of employer and at least one business man as reference.

Turning Plaster of Paris Novelties

[*Continued from page* 99]

finally, a hole 2¼ or 2½ inches in diameter in the top block. This is assuming the blocks are approximately 1 inch thick. If you wish a taller candlestick, or one with greater diameter variations, cut the hole diameters accordingly. In each case, make a saw cut through one side of the mold.

Place the bottom mold on a flat surface, and pour it full. Place the next mold on this, exactly centered if possible, and pour this full. Continue with all the blocks, one at a time, until the casting is completed. Before the top portion of plaster sets, push a ½" dowel one inch long into the exact center of the top. This dowel will prevent the tail stock center from "creeping" and producing an annoying wobble.

When ready for the lathe, locate the live end center and seat this center firmly in the plaster. It may be necessary to drill a hole about ⅛ inch deep in the stock for the spur center. Now prick punch the center of the dowel, drop a bit of oil on it, and fit it into the tail stock. Turn the candlestick to shape, leaving the top depression until last. Use your narrowest chisel or a sharpened file tang for this part of the work. Before the dead center waste is entirely cut away stop the motor and break out the peg.

[*Continued on page* 160]

Death Stalks the Modern Explorer

[*Continued from page* 50]

volves the complete forsaking of human aid. It also involves the total dependence on brilliant navigation and on the guiding signals of radio.

This fall, Ellsworth, with his co-pilot and radio operator, Herbert Hollock-Kenyon, took off across the frigid sea. It was estimated that the trip from Dundee Island to the Bay of Whales would take 17 hours. They had gasoline enough for 20. After the takeoff their radio sent out frequent messages from seven o'clock until 10:48, when it said, "All well." Then, at 11:05, came a message on Ellsworth's wavelength that was an unintelligible jumble. Walter Lanz, radio man on the *Wyatt Earp*, could decipher none of the weird buzzings that came from his receiver. And after that—silence.

The two airmen had a full ration of supplies for eight weeks. Food, an airplane and the radio—these were their only guaranty against grim death in frozen wastes. With their radio gone their perils are multiplied as they can not guide rescuers to their position.

The *Wyatt Earp* had to make a 10,000-mile journey through the seas to get fresh sup-

[*Continued on page* 159]

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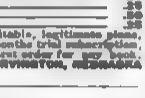

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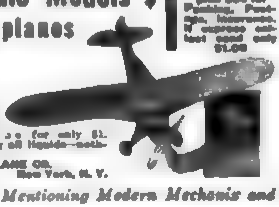

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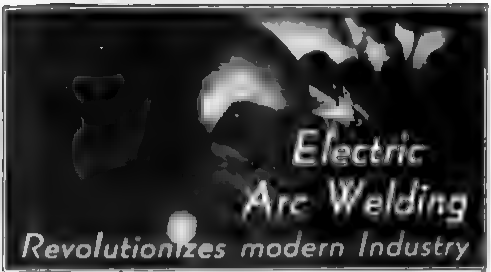

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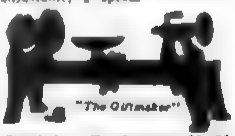

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Tiny Gadgets Make Great Autos

[*Continued from page* 142]

been extremely active. Nash owners can press a button on the dash and electrical contact is made with the oil pan float, registering the quantity of lubricant in the crankcase. There is a similar accessory in the Hudson and Terraplane. The old rod-style oil gauge seems on its way to the discard. In the Lincoln Zephyr the oil level is indicated by a red-topped float which projects between the cylinder heads of the V-type motor.

Dual Ratio Drive Adds Speed; Saves Gas

Four-speed transmissions or over-drives which automatically bring a lower gear ratio into play when the car reaches a predetermined speed are growing in favor. This device is variously called an over-drive, super-drive, or dual ratio. When a car so equipped reaches a speed of 45 miles an hour, the driver can bring the over-drive into action by disengaging the clutch. At 60 miles an hour the motor is turning over at a speed equivalent to 45 in fixed ratio drives, with obvious advantages of economy and smoothness. Pierce-Arrow, Nash, Hupmobile, Studebaker, Auburn, De Soto, and Chrysler offer this feature. Chrysler employs a special speedometer dial which not only shows the speed in miles per hour, but also the engine revolutions.

The search for devices to insure smooth riding goes on endlessly. Knee action or individual front wheel suspension continue in favor, and there are several interesting new solutions to the problem. Dodge has what is described as a "ride levelator," which is comprised of a horizontal bar passing behind the radiator grille and anchored to the shock absorbers. Hudson and Terraplane attack the smooth ride problem by attaching forged steel torque arms to the front axle to confine its motion to a true vertical arc.

Many Conveniences in Evidence

A number of ingenious new accessories are in evidence. Several cars provide flexible spoke steering wheels. In the Chrysler, the upper half of the wheel is entirely open to permit clear vision of the instrument panel.

Nash makes it unnecessary to lift the motor hood to fill the car with oil and water. A small door in the side of the hood enables these liquids to be poured conveniently into feed pipes. Hudson offers a curved instrument panel, semi-cylindrical in form, with the dials in the same plane as the driver's face. A new departure in ventilating systems is also featured by Hudson and Terraplane, in the form of a screened opening cut through the floor directly above the rear axle. When the windows are closed, air can enter only through this cleansing filter.

[*Continued on page* 160]

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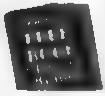

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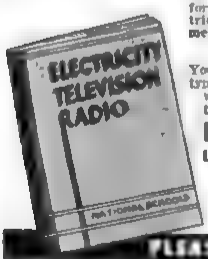

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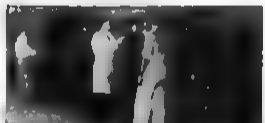

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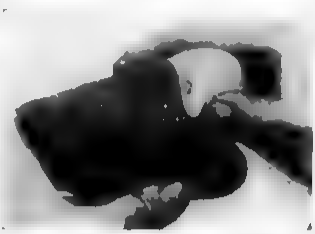

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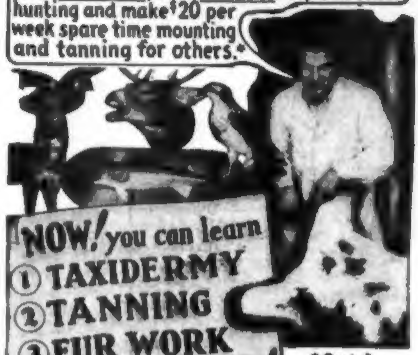

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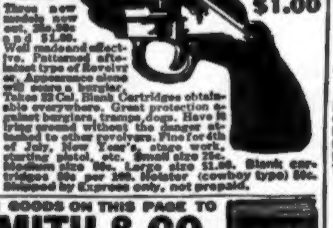

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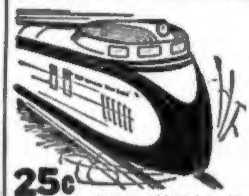

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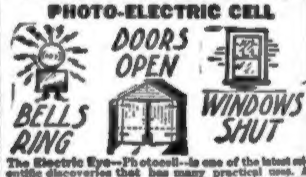

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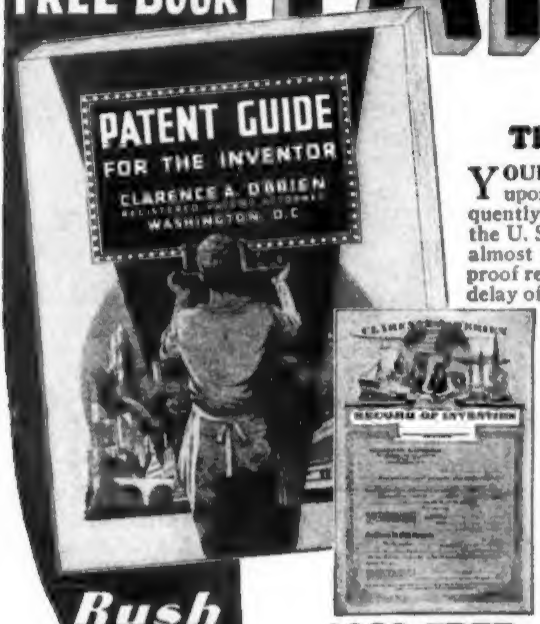

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